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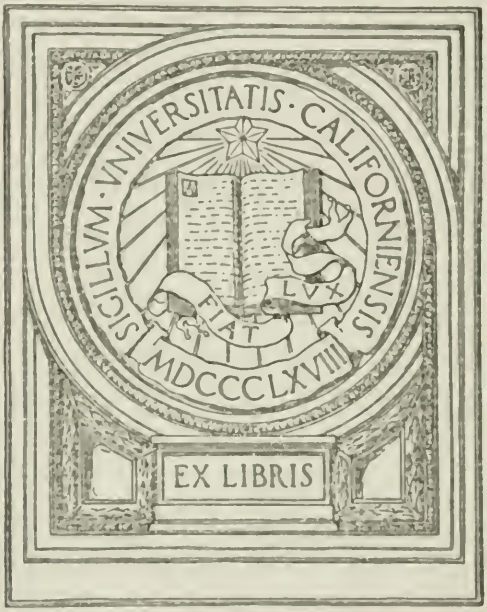

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

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THE STORY OF THE CATTLE-FEVER TICK

WHAT EVERY SOUTHERN CHILD SHOULD KNOW ABOUT CATTLE TICKS

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON
1927

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ANIMAL INDUSTRY

DEAR CHILDREN OF THE SOUTH:

This story book tells you why so many cows and steers and calves in the South get sick and die. I know that you would rather see fat, healthy cattle than thin and sick ones. Most cattle that die of sickness in the South die from the bites of cattle-fever ticks. The ticks carry tick fever from sick animals to healthy ones. Other names for tick fever are "redwater" and "murrain." Some cattle that the ticks bite do not die, but the fever ticks prevent them from giving as much milk or growing into as good meat animals as they otherwise would.

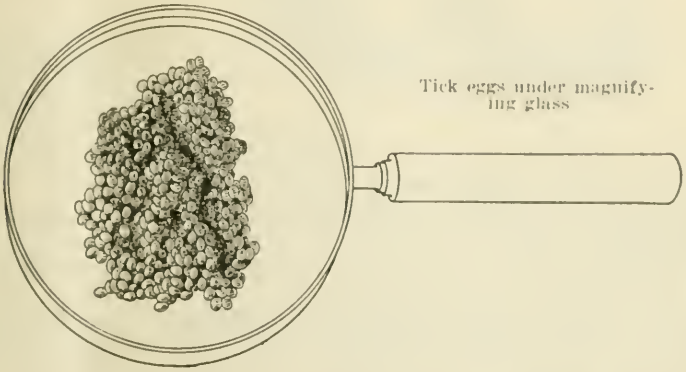
This story book tells how to get rid of these robber ticks that bite cattle and suck their blood. The best way to fight ticks is to build dipping vats and make the cattle swim through a medicine that kills the ticks. The medicine doesn't hurt the cattle at all. In many counties people have got rid of ticks that way and now are sending to market the milk and meat that the ticks used to steal.

Get your father and mother to read this story book and to help fight cattle-fever ticks. I hope you will like this little book and show it to your friends.

J. R. MOHLER,
Chief, Bureau of Animal Industry.

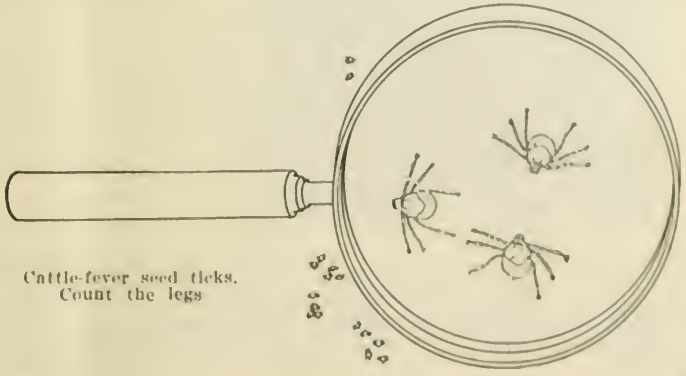
THE STORY OF THE CATTLE FEVER TICK

One warm summer day an olive-green cattle-fever tick laid 4,000 tiny eggs in the grass on a southern farm. These eggs were waxy brown in color and were not much larger than a turnip seed. Here is a picture of the tiny eggs:



Tick eggs under magnifying glass

These little eggs were kept warm by the sun. In less than a month they hatched out into lively, hungry seed ticks. Each seed tick was smaller than the head of a pin. If you had looked at these ticks through a magnifying glass you would have seen that each one had six legs.



Cattle-fever seed ticks. Count the legs

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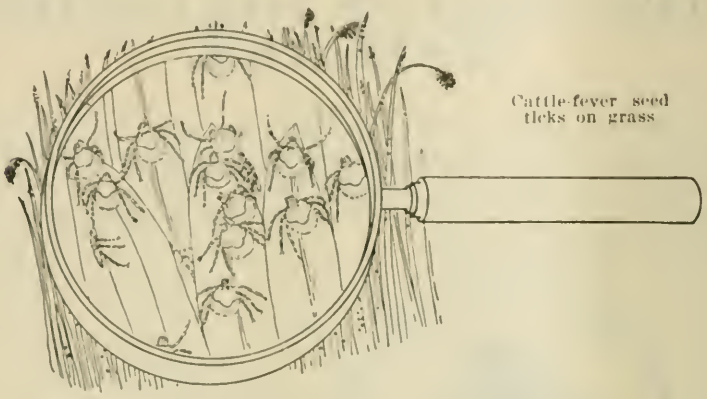
These tiny seed ticks were very hungry. They wanted to get some blood from a cow or steer or calf. Blood is the only food they can eat.

The hungry baby ticks crawled to the tips of the grass and to the tops of weeds and bushes. They waited there for an animal to pass by. This picture shows the baby ticks on the grass lying in wait for a cow or calf or steer.



Cattle-fever seed ticks on grass

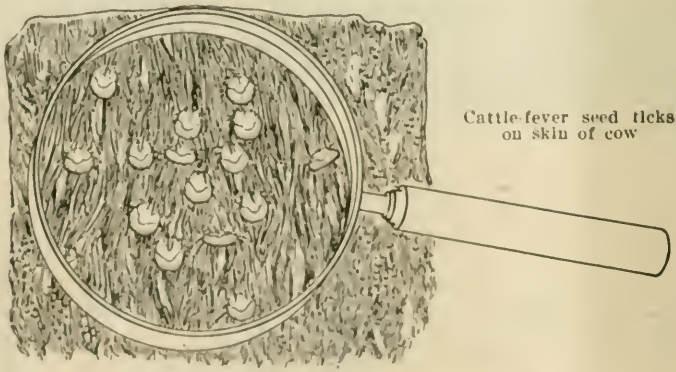
A cow walked slowly by the spot where the little ticks were hiding. The ticks smelled blood and got ready to get on the cow.

Many of the seed ticks were able to get on her tail or her neck or her legs.

Every baby tick on the cow began to hunt for a thin place in her hide.

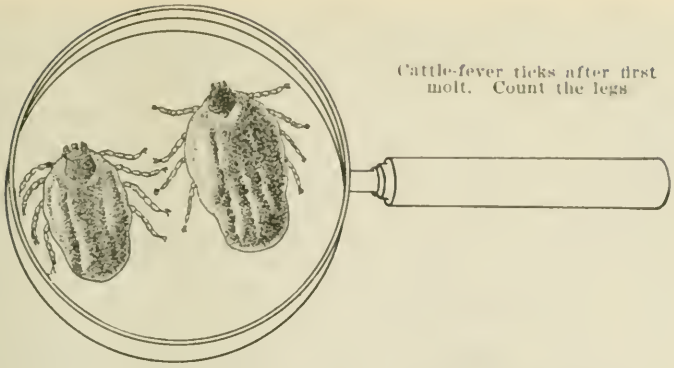
As soon as each tick had found a tender spot, it began to bury its head in the hide. It was digging a tiny well to the blood in the cow.

Here are seed ticks driving their little wells to the blood in the cow:



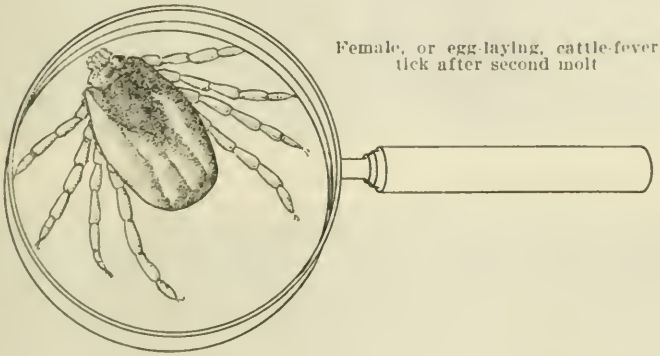
Cattle-fever seed ticks on skin of cow

When the baby ticks got their first taste of blood, they began to suck blood as fast as they could. Every day they grew a little larger. They sucked blood and grew for about a week. Then they shed their skins, which is called molting, and became little eight-legged ticks.

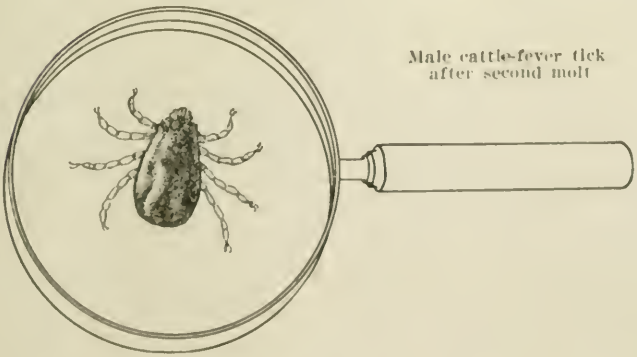


Cattle-fever ticks after first molt. Count the legs

The little eight-legged ticks sucked blood again and kept on growing until they changed or molted a second time. After the second molt they looked like this:



Female, or egg-laying, cattle-fever tick after second molt



Male cattle-fever tick after second molt

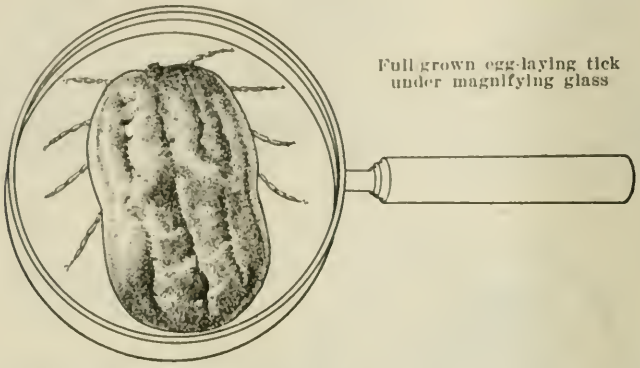
After this second change some of the ticks had become brown male ticks. The others had become egg-laying ticks. The egg-laying ticks at first were not much larger than the brown male ticks. The brown male ticks did not grow any more. But the egg-laying ticks grew larger and larger, and the larger they grew the more blood they sucked from the cow.

They made bigger wells in the hide so that they could get blood faster.

Each of these wells or tick bites makes a sore spot and a mark in the leather made from the hide. (See illustrations on p. 5.)

The egg-laying ticks got so big and fat that they looked like tiny blood sausages, or little balloons. Each tick kept itself full of blood all the time. If you had crushed one of them, you would have seen the blood in it. The male ticks stay brown, but the egg-laying ticks, when they are fat, are olive-green.

The big, olive-green, egg-laying ticks look like this:



Full grown egg-laying tick under magnifying glass

The ticks sucked so much blood that the cow became thin and scrawny. The cow was making blood out of feed as fast as she could. But she could not make blood fast enough to feed the ticks and at the same time keep well and strong and fat herself.

The ticks got a lot of the blood that the milk cells of the udder needed for making milk. The cow's milk fell off nearly 2 quarts a day.

The ticks also got a lot of the blood that should have gone into meat and fat on the cow.

She was so thin that the butcher would not buy her to kill for meat.

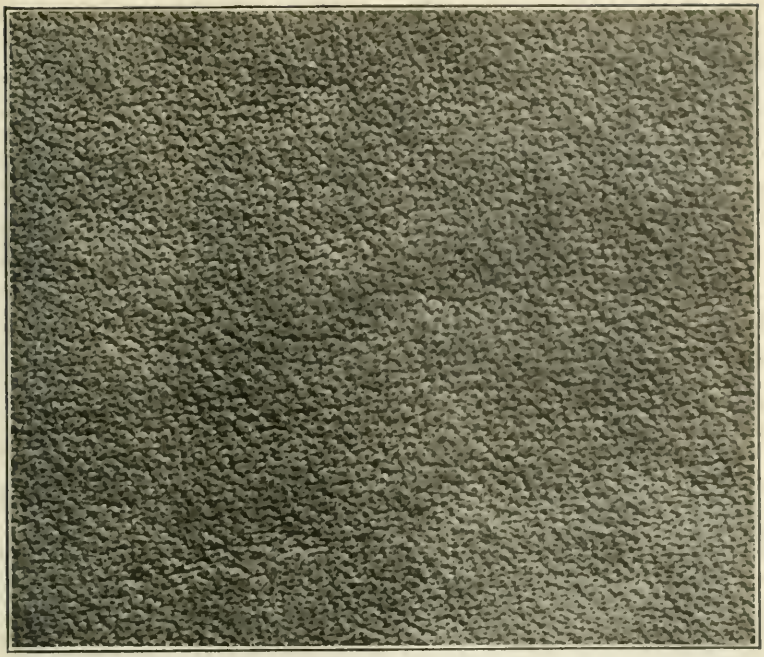
Her owner wondered why she ate so much costly feed and gave so little milk and did not grow fat.

The reason was that a large part of the feed she was eating did not help her, but was wasted in feeding the bloodsucking ticks.

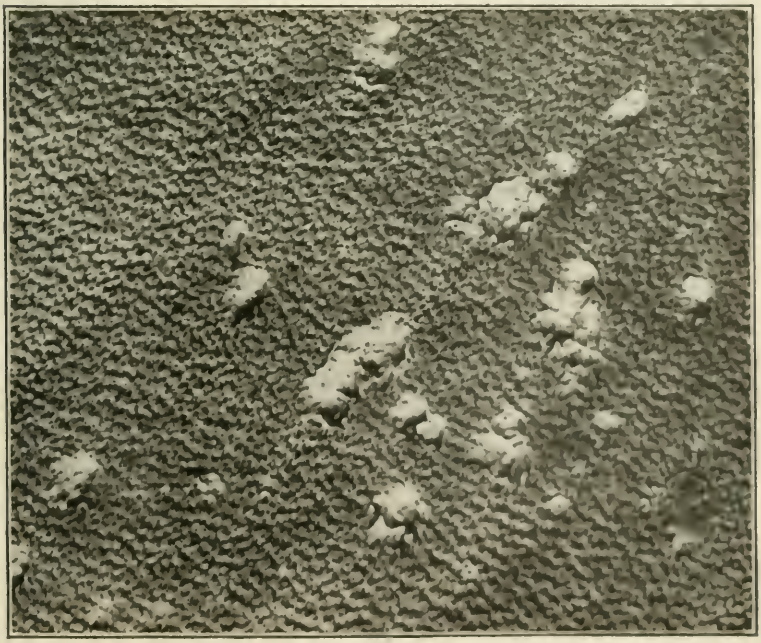
If these ticks had gotten on a steer they would have sucked from it blood that should have gone to help it grow into a fine, heavy, fat, beef animal.

If the ticks had gotten on a calf they would have sucked so much blood from it that the calf could not grow into a strong, healthy cow or steer.

You can see that wherever there are ticks the cattle owner will have less milk and butter and meat to send to market. He will have to waste a lot of feed in feeding ticks which do no good at all and hurt or kill his stock.



Leather made from a hide not bitten by ticks



Poor, rough leather from a tick-bitten hide

You can see why a tick-bitten hide is worth from 75 cents to $1.50 less than one not full of tick holes and spots

THE TICKS BEGIN A NEW FAMILY

The brown ticks and the egg-laying ticks kept on sucking blood until they could eat no more. The brown ticks ate a great deal, but they did not grow. The egg-laying ticks became olive-green in color as they grew fatter and fatter.

Ticks steal milk. Many ticks on a cow may reduce her milk 2 quarts a day

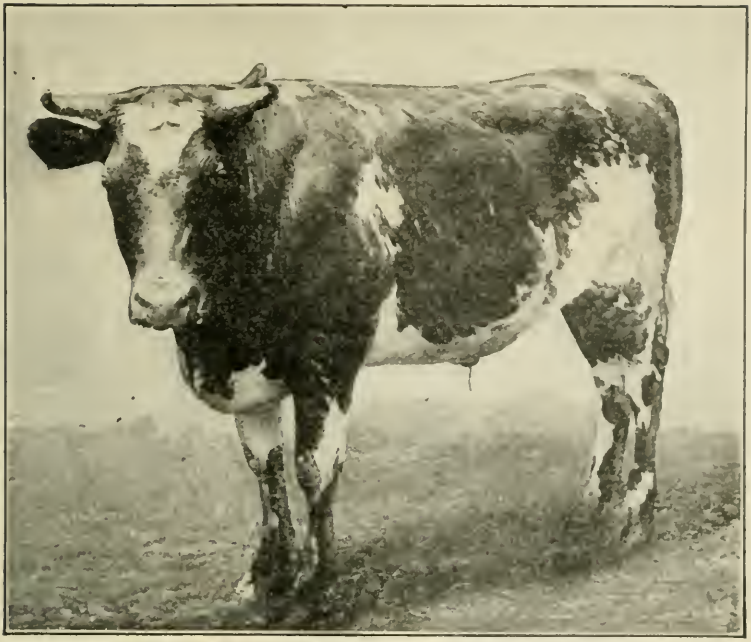
The brown ticks at last dropped off the cow and died. They had finished their short, but harmful lives.

The olive-green, or egg-laying, ticks had used the blood from the cow to grow fat themselves and also to store up eggs in their bodies. When they had eaten all the blood they could use, the egg-

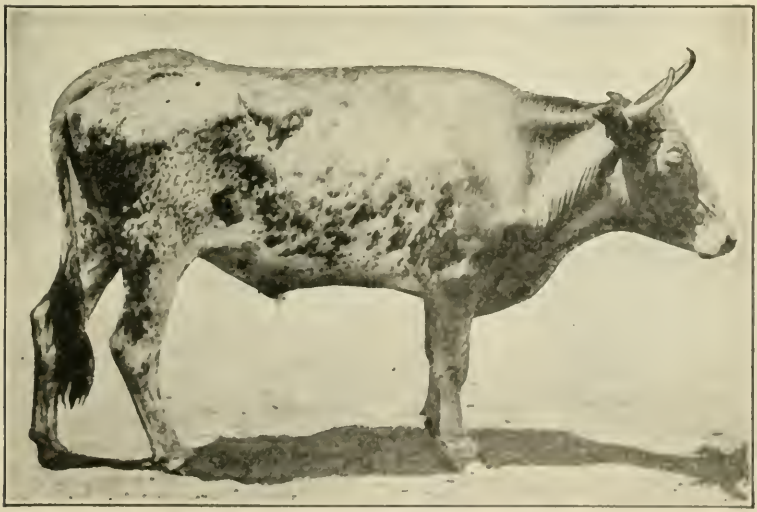
The fever ticks have kept this cow from turning much of her feed into milk and flesh

laying ticks dropped off the cow into the grass. There, each laid 4,000 to 5,000 eggs. Having begun a new bloodsucking family, the green ticks died.

The eggs hatched into more hungry ticks to crawl on to the cattle and to suck more blood.



This steer was not sucked thin by ticks. All his feed went to make beef and fat and bone



This steer had to feed ticks as well as himself His feed went largely to fatten ticks

Which steer would you choose if you were the butcher?

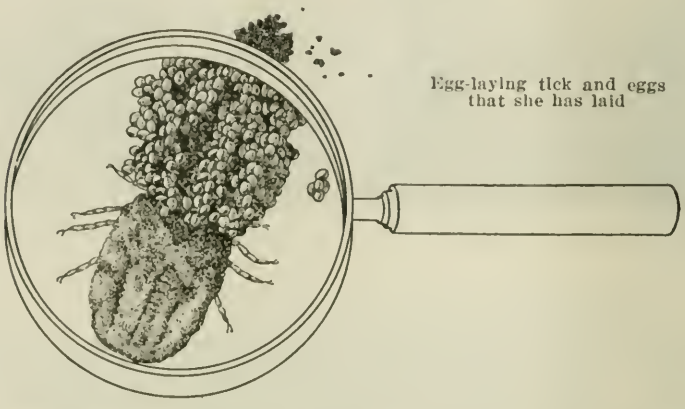
If only we could find and destroy all these tiny eggs laid in the grass, we could keep the seed ticks from hatching out. But no one can hope to find all these tiny eggs that are in a ticky pasture.

The easiest and surest way to get rid of ticks is to kill them while they are on the animal and before they have a chance to lay eggs in the grass.

Ticks can be killed on cows, steers, calves, and horses by making the animals swim through a dipping vat full of a medicine which kills the ticks.

HOW TICKS KILL CATTLE

The owner of the cow on which the ticks had been feeding saw that she was getting sick. She was very thin and weak and feverish. The doctor looked at her. He said: "The cow is dying of tick fever." Tick fever is also called redwater, murrain, and splenetic, southern, or Texas fever. The cow got so weak it could not get up



Egg-laying tick and eggs that she has laid

on its legs. At last it died in the pasture. The cow had cost $40 and the owner lost all this money.

HOW CATTLE GET TICK FEVER

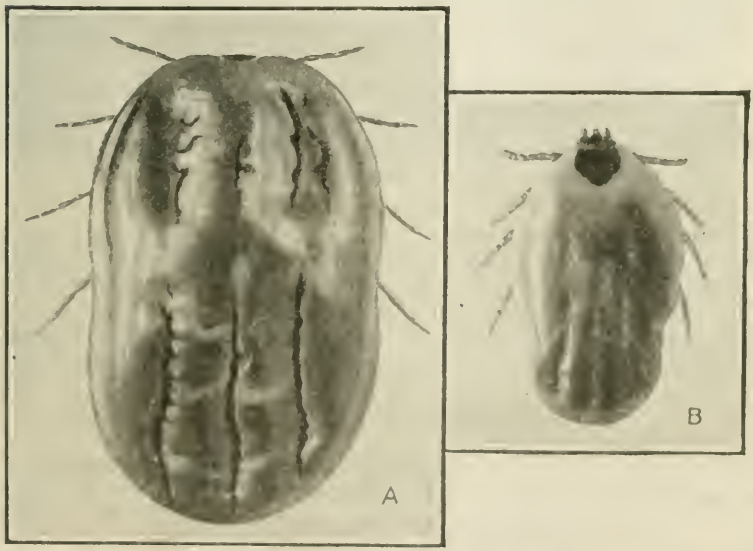
Cattle get tick fever from being bitten by a fever tick, and in no other way. They can not catch it from the air, nor the feed they eat, nor the water they drink. They do not get it by being near another animal which has the fever.

No other kind of tick than the cattle-fever tick carries this fever. The wood ticks which sometimes get on children and the ticks we find on dogs, rabbits, chickens, turtles, and many other animals do not carry tick fever. These other kinds of ticks sometimes get on cattle and annoy them, but they do not and can not give tick fever to the cattle.

The fever tick carries cattle fever from a sick animal to a well animal. It carries this disease much as certain kinds of mosquitoes carry malaria or yellow fever from one human being to another.

But the ticks do not carry this fever straight from a sick animal to a well one. Once a tick has got on an animal it does not leave that

This cow is dying with tick fever



These are fever ticks. A, full grown female; B, young fever tick after first molt. The pictures are much larger than real ticks

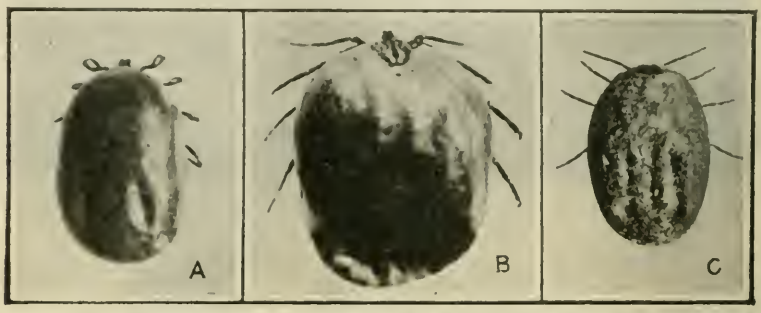
animal until it drops off to die or to lay eggs. So live ticks do not pass from one cow or steer to another.

How do the fever ticks carry tick fever from a sick animal to a well animal? The tick that is sucking blood from a sick animal gets the germs of this fever in the blood it eats. These fever germs stay in the tick's body and get into its eggs. The germs in the egg get into the body of the baby tick before it hatches out. The baby tick after it hatches out carries these germs with it when it gets on a cow or steer or calf in search of blood.

When the tick bores its well into the hide it lets some of these fever germs get into the blood of the animal. These germs spread through the blood of the cow or steer or calf and make it sick with tick fever.

Sometimes these germs do not make the animal very sick. Such animals do not die of fever. But in many cases the germs make the cattle very sick and kill them.

Thousands of cows and steers and calves are killed every year in the South by this tick fever carried by ticks.



These ticks, found on dogs and other animals, do not give tick fever to cattle. A, American dog tick; B, Gulf coast tick; C, brown dog tick. (Enlarged)

Many animals that do not die of the fever are weak and scrawny and sickly for the rest of their lives.

The fever and the loss of the blood that the ticks suck out weaken many animals so that they can not stand winter storms. They die of exposure or starvation. Many of these would not die if the fever ticks had not weakened them.

Many cows are made so weak by the fever and the loss of the blood the ticks suck that they can not care for their baby calves in the spring. Many calves die at this season.

It is called "spring loss," and costs cattle raisers a lot of money.

Cattle owners could save these losses by killing the fever ticks.

AN ENEMY OF FINE CATTLE

Cattle brought into the South from places where there are no fever ticks get tick fever very easily and are almost sure to die from it. This is why good, tick-free breeding animals can not be brought to a ticky farm to improve the breed of the cattle. The fever ticks are almost sure to kill good milk cows, good bulls, or good beef cattle

brought in from tick-free places. Fine animals are so valuable that a farmer can not afford to keep them if ticks suck out their blood and keep them from being healthy.

This is why we see so many scrawny cattle where there are ticks. In ticky country we do not see herds of fine, fat, grade, or purebred stock. But where the tick has been killed in the South you will see fatter and better cattle on almost every farm.

GETTING RID OF TICKS HELPS A COUNTY

You can see that it is a very good thing for cattle owners to get rid of ticks. Without ticks they have more milk and meat to sell. Their cattle do not die of fever. They can raise more cattle. They can raise better kinds of cattle. They get full returns from their feed. They make more money.

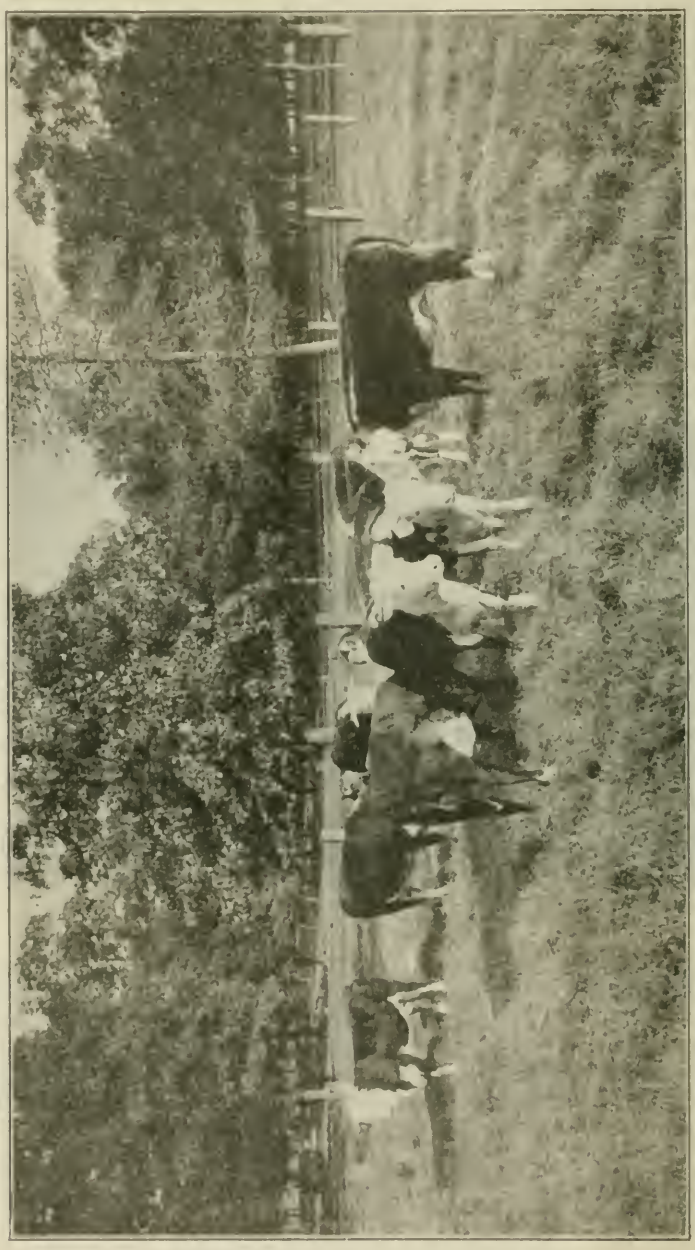
The kind of cattle the fever tick lets live

Getting rid of fever ticks is a good thing also for all the business men of the county. If cattle raisers and dairymen have more milk and meat to sell, they will have more money to spend in the stores for clothes and groceries and machinery. They will have more money to put into the banks. When there are no ticks, the cattle raisers get more money for their beef cattle at the big cattle markets. This brings more money from the outside into the county. When more money comes into the county, the people of the county are more prosperous. There is more business and more work for them. Everyone gets a share of the extra money.

A MEDICINE WHICH KILLS TICKS

It is easy to get rid of cattle-fever ticks. It does not cost much money nor take very much time or trouble. It is worth doing.

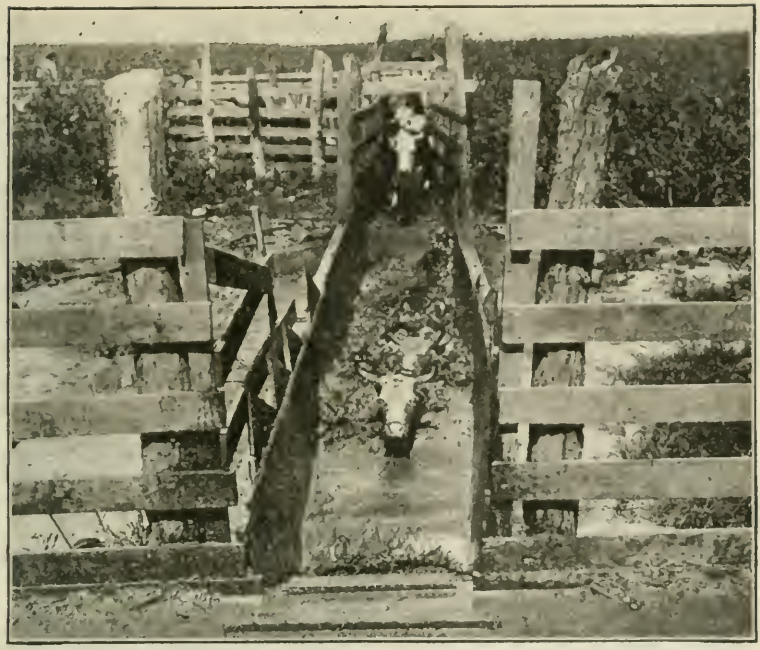
The United States Department of Agriculture has found a sure and simple way to kill all the fever ticks in a county.



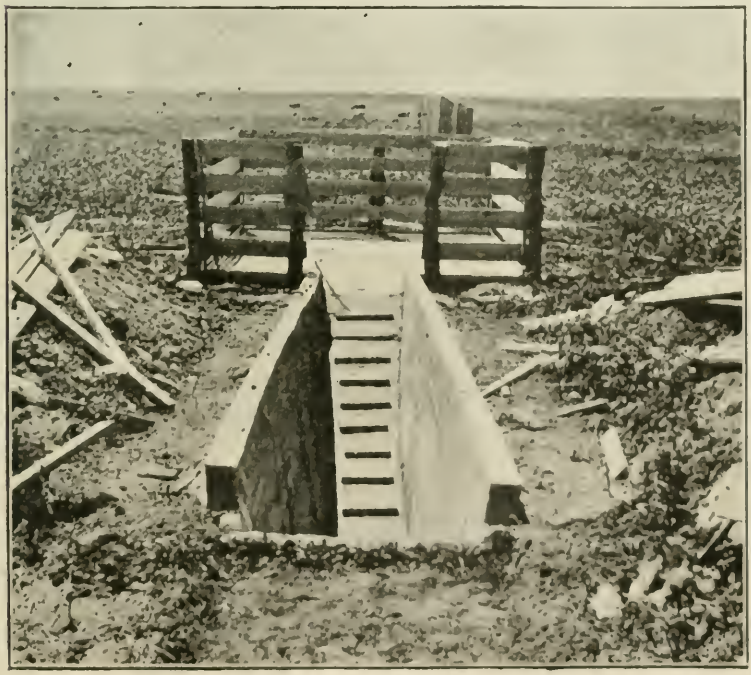
Where the fever ticks have been driven out, southern farmers are beginning to raise cattle like those shown. The cows give more milk. The steers make more meat from their feed. The calves are worth more money

It has made a medicine called an arsenical bath. This medicine kills all the ticks that are wet with it.

The easiest way to wet the ticks is to make the cattle swim through a vat filled with this medicine.



When the cattle swim through this vat, the medicine kills the ticks



This shows how the vat is built

To make a vat, the people first dig a deep, long trench. They line this trench with concrete and cement, so that it will hold water. Then they fill the vat with water and put the arsenic and other medicines into the water. This makes what is called an "arsenical dipping solution."

The cattle are driven to the vat and made to swim through the medicine.

The medicine does not hurt the animal, but kills all the seed ticks, male ticks, and egg-laying ticks that are on it.

After the cattle have been dipped they are driven back to their pastures.

The cattle become traps for the seed ticks in the grass and for the little ticks that will hatch out from the eggs already in the grass.

The seed ticks in the pasture crawl up on the animals after they have been dipped. In two weeks the animals are given another swim

Dipped animals trapping baby ticks

through the medicine. The medicine kills all the young ticks that are on the cattle. The ticks are killed before they have had a chance to make any eggs or suck much blood.

Then the animals go back to pasture again and trap still more seed ticks. After the animals have been dipped in the medicine every two weeks all spring and summer there will be no more ticks to lay eggs. There will be no more eggs left to hatch out a fresh crop of seed ticks. All the ticks that have been trapped by the cattle have been killed by dipping. All the little seed ticks that did not get on to the cattle have starved to death.

EVERY ANIMAL MUST BE DIPPED

Where the people of a county see that every cow, calf, steer, horse, mule, and colt is dipped regularly during the spring and summer,

they will get rid of the ticks in their county in a single year. All the cattle in the county must be dipped. It will not do to dip some cattle and let others go undipped. The undipped cattle will spread egg-laying ticks along the roads and in the free pastures and woods. The eggs which these ticks lay will hatch into seed ticks that will get on undipped cattle. Those that do not get on to cattle during the dipping season may still be alive in the pasture in the fall. They may then get back on to the dipped cattle when it is too cold to dip cattle again in the medicine.

Every cow, steer, or calf that is not dipped in the medicine regularly is liable to carry and spread ticks wherever it goes. So long as there are any ticks alive on any of the cattle the county can not get entirely rid of ticks.

HORSES AND MULES ALSO MUST BE DIPPED

Fever ticks sometimes hide on horses and colts and mules. They do not cause fever in these animals. The few ticks that are on horses and mules must be killed or the seed ticks which hatch from their eggs will get on cattle. Therefore, it is necessary to make horses and colts and mules, as well as cattle, swim through the medicine.

IT PAYS TO DIP CATTLE

It does not cost anyone much money to dip the animals. All the people of the county help pay for the vats, the medicine, and for the dipping inspectors.

Where people want to get rid of the ticks the United States Department of Agriculture, without cost to the county, will send trained men to help the county build vats, mix the medicine, and dip the cattle.

The extra money the people will make from their cattle will pay them back many times for the money they spend for dipping. The extra money will pay farmers well for all the time they use in driving their cattle to the vats.

QUARANTINE NECESSARY

These ticks were so dangerous to cattle in tick-free country that the United States Government said that no cattle with fever ticks on them should be shipped out of a ticky State to go to farms where there were no fever ticks. This is called a "quarantine" to prevent the spread of tick fever. The Government made this rule because these fever ticks would give the fever to tick-free cattle and kill them.

This rule makes it harder for owners of ticky cattle to ship their cattle to the big cattle markets in other States.

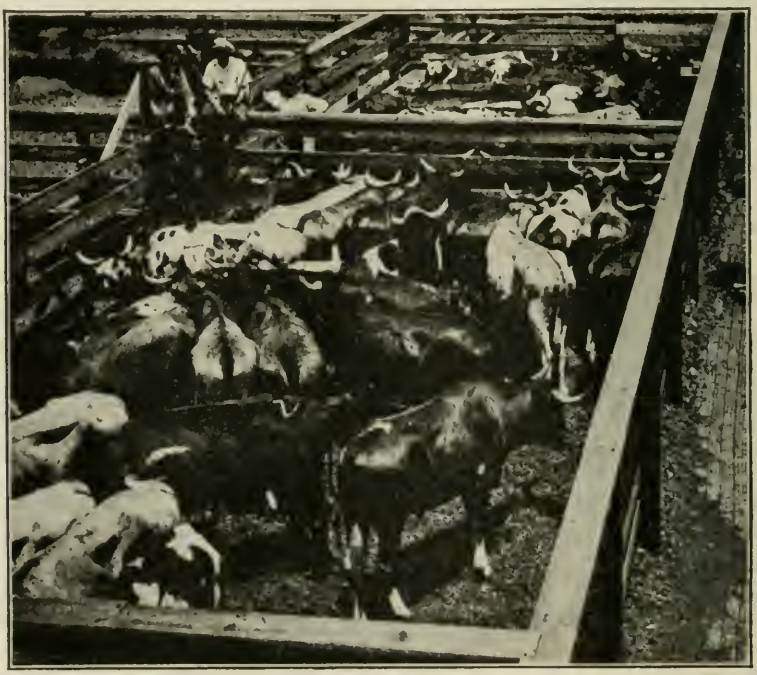
Ticky cattle bring lower prices per pound than tick-free cattle. It is more trouble and it costs more to get ticky cattle ready for shipment.

THE TICK IS DIPPED OUT OF MANY COUNTIES

The people living in many counties in the quarantined area at last got tired of ticks. They asked the United States Department of Agriculture to help them. The department sent men to show them how to build dipping vats and how to mix the medicine to kill the ticks.

Wherever the people dipped all their cattle regularly they got rid of these ticks, and their county was released from quarantine.

These counties have been freed from the troublesome quarantine rules, and the cattle are doing better and bringing better prices. In some of these released counties a few of the people have been careless



Cattle in quarantine pens. These cattle are from ticky country. They are kept away from clean cattle

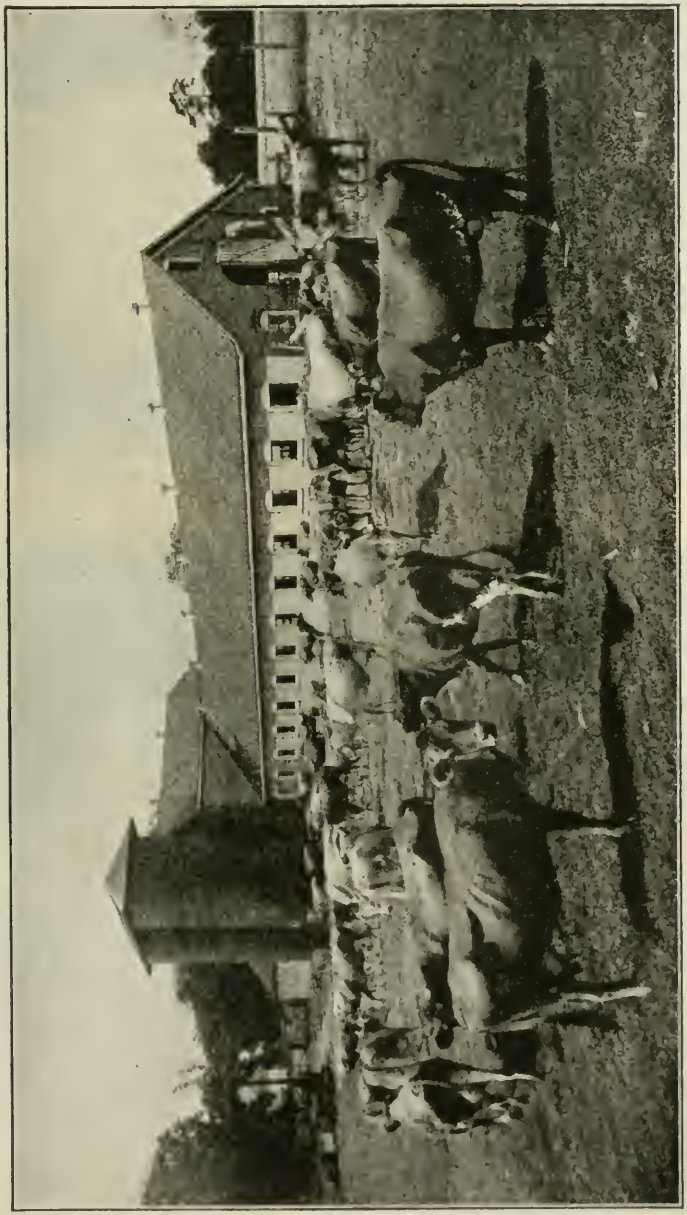
about dipping all their cattle regularly, and these people must continue to dip until all ticks are killed. In some sections the people have not yet got rid of fever ticks. The people in other places are now dipping their cattle to get rid of ticks this year.

GLAD THEY GOT RID OF TICKS

The people who live in the sections where ticks have been dipped out are very glad now that they got rid of the fever ticks. They will not allow ticky cattle to be shipped into their clean counties for fear that the cattle ticks will get back on their cattle.

They write letters to the Deparment of Agriculture saying that they get more milk from their cows. They say that their beef animals

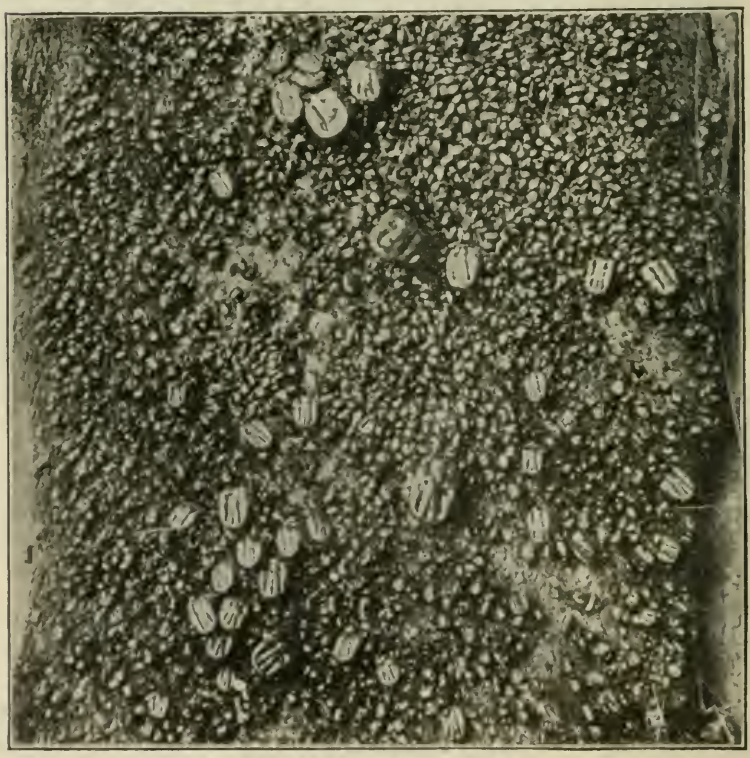
grow fatter and bigger with the same quantity of feed. They tell how they have improved their stock by bringing in better breeding animals. Their cattle no longer die from tick fever. They get more



Dairy farm in a southern county which dipped out the fever ticks. Dairy cows like these can live and make money for dairymen where the tick has been dipped out

per pound for their tick-free cattle at the big stock yards. The stock raisers say that cattle are worth $7.50 more per head where the tick has been dipped out.

Don't you feel sorry for this animal?



Photograph of ticks on a steer's hide

DO YOU LIVE IN A TICKY COUNTY?

Perhaps you live in a place that is still in quarantine. If you do, there are fever ticks on the cattle in the country around your home.

The next time you see some cattle in the country or at the stock pens go close to them and see whether you can find fever ticks on them. Notice how these ticks keep their heads buried in the hide so that they can suck blood from the animal and poison it with fever.

Perhaps the people in your quarantined county also are getting tired of ticks. Perhaps they, too, are beginning to build vats and are getting ready to drive their cattle through the medicine.

Ask your father about this. If he says that your county is not getting rid of ticks, then ask him to read this little story carefully. Tell him it means dollars and cents to him whether he owns any cattle or not.

BOOKS ABOUT TICKS FOR GROWN-UPS

If your parents want to know all about the tick and how to get rid of it, tell them to write a postal card to the United States Department of Agriculture, Washington, D. C., or to your State livestock officials. Without charge, they will send little books for grown people telling about the fever ticks and how to get rid of them in your county.

DIP THAT TICK

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REGARDING THE

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GENERAL STATEMENT

NATURE AND SCOPE OF THE JOURNAL

The JOURNAL OF AGRICULTURAL RESEARCH is an organ for the publication of original papers reporting the results or progress of new investigations in the field of agriculture which are primarily of technical interest. It is restricted to contributions from the United States Department of Agriculture and the State agricultural experiment stations, and is conducted cooperatively by the United States Department of Agriculture and the Association of Land-Grant Colleges and Universities. The financial and strictly editorial responsibility for the JOURNAL is borne by the Department of Agriculture.

JOURNAL papers may report the results of complete investigations or definite results in only one phase of an investigation. The aim is to record in concise form the results of investigations which mark advances and have permanent value. The JOURNAL is designed to record current progress in research, not in the whole field of science, but in that which bears rather directly on agriculture or which applies definitely to agricultural problems. While the applicability of an article directly or indirectly to agriculture should not be construed too narrowly, the special field of the JOURNAL deserves to be borne in mind as implying certain limitations. Papers reporting work which lies primarily in the field of pure or general

science are considered more suitable for other publications than for a journal devoted to agricultural research.

The publication of monographs, cyclopedic articles, extensive reviews, historical or otherwise, and of controversial articles is contrary to the editorial policy of the JOURNAL. Accounts of conventional tests and experiments which do not involve originality in plan or method or provide for the control or accurate measurement of the experimental conditions, or which fail definitely to throw light upon the relationship to principles or limiting factors, are not considered suitable for publication in the JOURNAL. The same is true of descriptions of local variety tests, fertilizer and feeding experiments, and routine analyses which merely contribute to the mass of similar data.

If a preliminary report of research has been released for publication in an outside journal, a copy of the preliminary paper should accompany the article submitted for the JOURNAL OF AGRICULTURAL RESEARCH. Extensive preliminary publication will preclude publication in the JOURNAL.

As the JOURNAL is a technical publication, designed for technical readers, general familiarity with the subjects under discussion may be assumed. This will guard against lengthy introductions and unnecessary discussion of matters which are to a considerable extent academic or of common scientific knowledge.

An account of a scientific investigation ought to make clear at the outset the primary object and purpose of the undertaking and present the successive steps in the process of attaining the objective. In the end the basis for a sound scientific conclusion or statement of the advance accomplished should be set forth. While negative results may not be without value, contributions which mark advances in the knowledge and further study of a subject will as a rule be considered as of primary importance. Reports of progress or articles which fail to establish a result that can be stated fairly definitely will be regarded as questionable for publication in the JOURNAL.

Tabulations should not be excessive in number or unnecessarily detailed in character. It is, of course, impracticable to present all the data accumulated in the course of an investigation. Selection of representative data and condensation of tabular matter into carefully considered summaries should therefore receive adequate attention. Furthermore, the data presented and what they are intended to show should be sufficiently interpreted so that the reader is not left in doubt as to the intended significance of the material.

The JOURNAL is an organ for recording research, not for discussion, speculation, or monographic reviews. Lengthy argument, discussion, and speculation are therefore considered out of place in accounts of investigations except as showing their bearings.

Detailed consideration of the practical applications of the findings are not deemed necessary for the reason that such applications will be readily apparent to specialists, for whom the JOURNAL is primarily designed.

A discussion which merely outlines the things done and is repeated in the summary is superfluous. "Discussion" is the place for comments, explanations, and suggestions not embodied in the descriptive part of the article.

APPROVAL OF MANUSCRIPTS AND EDITORIAL SUPERVISION

The approval of manuscripts submitted for publication in the JOURNAL and the supervision of its general policy and management are vested in a Joint Committee on Policy and Manuscripts composed of six members. This committee is divided into two subcommittees of three members each, one appointed by the Secretary of Agriculture and the other by the Association of Land-Grant Colleges and Universities. The chairman of the department subcommittee acts as chairman of the joint committee.

The subcommittee representing the department has jurisdiction over the manuscripts originating in the department. The subcommittee representing the land-grant colleges and universities has jurisdiction over the manuscripts originating at the State experiment stations. The supervision of a manuscript representing cooperative investigations between the department and an experiment station is determined by the affiliation of the senior author.

Every article intended for publication in the JOURNAL should bear the formal approval of the chief of the department bureau or of the director of the experiment station from which the paper emanates. The letter of transmittal accompanying each manuscript should state that the manuscript has been read and approved by one or more persons (named) selected because of their familiarity with the subject. Evidence should also be supplied that the data as represented by the tables, graphs, summaries, and conclusions have been approved from the statistical viewpoint by some one (named) who is competent to judge, and that the computations have been verified. Manuscripts originating in the Department of Agriculture should be edited by the bureau editor before being submitted for publication.

Under the general direction of the joint committee, the editorial chief of publications of the department has immediate editorial supervision of all manuscripts published in the JOURNAL. He superintends the checking of data and literature citations, the final editing of the manuscript, the preparation of the illustrations for the printer, the marking for type and arrangement of headings, text, and tables, the checking of the proofs, the keeping of the office records of all manuscripts, and the distribution of the JOURNAL and the separates.

Manuscripts originating in the Department of Agriculture should be sent to the Office of Information, where appropriate records of the receipt of manuscripts and notifications regarding them are made by the editorial chief of publications. Each manuscript is then sent to the members of the subcommittee for examination. If the manuscript is disapproved by a majority of the subcommittee it is returned to the chief of the originating bureau by the chairman with a memorandum explaining the reasons for its rejection.

Manuscripts emanating from the State experiment stations should be sent to the chairman of the subcommittee in charge of station manuscripts. If a manuscript is approved by a majority of his subcommittee, the chairman then forwards it to the editorial chief of publications for final editing and preparation for the printer.

If the final editorial work reveals serious deficiencies in a paper it is returned to the author for correction and revision.

All manuscripts are handled editorially in the order of their receipt. The date of receipt is printed at the bottom of the first page of each published paper. For department papers it is the date they are received in the office of the editorial chief of publications, and for station papers it is the date they are received in the office of the chairman of the station subcommittee. On January 1 and July 1 of each year all papers on hand are renumbered in their previous numerical order.

The key number appearing in the lower right-hand corner of the first page of each article shows the total number of papers issued by the department bureau or State experiment station from which the paper emanates.

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JOURNAL

The edition of the JOURNAL is small and its free distribution is necessarily restricted. In addition to Government depositories, it is sent free upon request to libraries of universities, agricultural colleges, and experiment stations, to large technical schools, and other institutions and agencies whose work relates directly to agricultural research. A small exchange list is maintained, limited to institutions and publications whose technical papers have agricultural interest. As soon as a number of the JOURNAL is received from the press each author contributing to it is sent a copy. With this exception no copies are sent free to individuals.

Those who desire to subscribe for the JOURNAL should make remittance to the Superintendent of Documents, Government Printing Office, Washington, D. C., who handles all subscription lists. The price is $4 a year for domestic and $5 for foreign subscriptions. Single copies may be purchased for 20 cents (domestic) and 25 cents (foreign). These prices may vary somewhat from year to year. The JOURNAL is at present published semimonthly, two volumes being issued each year. Each volume therefore contains 12 numbers and the index.

SEPARATES

Each paper in the JOURNAL is reprinted as a separate. Separates are usually available for distribution within a short time after the JOURNAL containing the article is issued. One hundred copies of each separate are furnished to the originating bureau and fifty copies are furnished to the originating experiment station. If separates are desired in quantity, they should be ordered at the time of publication, when they may be purchased in bulk from the Superintendent of Documents practically at cost. Single copies of separates of articles originating either in the department or at the stations will be sent free to interested persons as long as the available supply lasts. Ordinarily after the separates are issued no further reprints are made. Mailing lists of individuals and institutions interested in the various special lines of agricultural research are supplied by the bureaus or stations and are maintained in order that effective distribution of the JOURNAL separates may be made. The number of separates of each article published depends upon the subject, the mailing lists, and the demand which is indicated at the time of going to press. To fill

future urgent requests a small reserve supply of each number of the JOURNAL and of each separate is kept in the Office of Information of the department.

SUGGESTIONS FOR THE PREPARATION OF MANUSCRIPTS

TEXT

When an article is being prepared for the JOURNAL OF AGRICULTURAL RESEARCH it is suggested that the author consult a recent copy of the JOURNAL and follow its style, especially in tables, illustrations, and literature citations.

To guard against deficiencies in scientific content, interpretation, or conclusions, authors are requested to have the paper critically read by coworkers in the field covered. Prepublication criticism should be welcomed by the author and duly considered, thus possibly avoiding mistakes which might be made the subject of justifiable criticism after publication.

Manuscripts should be on letter-size paper, about 8 by 10½ or 8½ by 11 inches, typewritten either triple or double space. *Single space should not be used.* If triple space is used for the body of the text, double space may be used for quotations, legends, footnotes, and tables.

The title should be brief but as indicative of the content of the article as possible.

Following the author's name there should be given his official title, and the office, bureau, or station department in which the work was done.

Although exceptions are justified in many cases, the standardized outline of JOURNAL papers includes the following in the order given: Introduction, review of literature, methods of experimentation, experimental data, interpretation and discussion of results, conclusions, summary, and literature cited.

Every page of a manuscript, including tables, should be numbered consecutively. Each table should appear on a separate page. Each table should also be definitely referred to or discussed in the text.

For convenience in handling at the printing office each page of the manuscript should begin a new paragraph; that is, no paragraph should carry over from one page to the next.

A table of contents showing the proper relation of the headings should always accompany the manuscript.

For orthography, capitalization, and hyphenation the accepted standards are those authorized by the Government Printing Office, which are Webster's New International Dictionary and the Style Manual of the Government Printing Office. The latter may be purchased from the Superintendent of Documents.

For the spelling of geographic names the authorities named below are followed in the order given:

1. Correct Orthography of Geographic Names (decisions of the United States Geographic Board).
2. United States Postal Guide.
3. Lippincott's Gazetteer of the World.
4. Rand, McNally & Co.'s Atlas.
5. International Postal Guide.

Arabic numerals are used in numbering all tables. "Table" is capitalized when it is followed by its numerical designation.

The author should very carefully check and recheck the manuscript, particularly the tabular data and the references to tables, illustrations, and literature cited. If it is possible to do so, the author should also have the manuscript carefully edited and rechecked before it is submitted for publication.

ILLUSTRATIONS

Only illustrations which are of good quality and which are necessary to a clear understanding of the text can be accepted for publication.

Each illustration must be specifically referred to in the text.

So far as possible line drawings should be used in preference to half-tones or color illustrations.

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All photographs should be submitted unmounted, and in an envelope.

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Separate parts of a text figure or plate are placed in contiguous position, instead of being separated by legends, and are designated by Roman capital letters A, B, C, etc. The parts of A, B, C, etc., are designated in italic letters *a*, *b*, *c*, etc.

In text references to figures or plates having these parts, the numbers and the letters should be separated by commas, thus:

"The plant shown in Plate 6, B, *a*, * * *" or in "Figure 10, C, *b*, * * *."

Also: "As may be seen in the infested plant (pl. 5, D, *c*)," or "(fig. 8, A, *d*)."

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Only references cited in the text should be listed in "Literature cited." If there are seven or more citations to literature they should be grouped together at the end of the paper under the heading "Literature cited"; if fewer than seven, they should be given in footnotes.

If the original of an article has not been consulted the following statement, in brackets, should be added to the citation: "Original not seen." If only an abstract can be cited, the word "abstract," in parenthesis, should follow the title.

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Societies and institutions are entered as authors of their publications, if these are not ascribed to individual authors.

EXAMPLES OF "LITERATURE CITED"

Book Citations

Bayliss, W. M.
1911. THE NATURE OF ENZYME ACTION. Ed. 2, 137 p., illus. London, New York [etc.].

Smith, E. F.
1905–14. BACTERIA IN RELATION TO PLANT DISEASES. 3 v. Washington, D. C. (Carnegie Inst. Wash. Pub. 27.)

Sorauer, P.
1909. HANDBUCH DER PFLANZENKRANKHEITEN. Aufl. 3, Bd. 1. Berlin.

Winfield, H.
1899. THE OIL OF MAIZE (ZEA MAYS). 49 p. Easton, Pa. (Thesis, Columbia Univ.)

Periodical Citations

Besley, H. J., and Baston, G. H.
1914. ACIDITY AS A FACTOR IN DETERMINING THE DEGREE OF SOUNDNESS OF CORN. U. S. Dept. Agr. Bul. 102, 45 p., illus.

Brown, A. J.
1909. THE SELECTIVE PERMEABILITY OF THE COVERINGS OF THE SEEDS OF HORDEUM VULGARE. Roy. Soc. [London] Proc. (B) 81: 82–93, illus.

Latta, W. C.
1900. FIELD TESTS OF VARIETIES OF WHEAT, COVERING NINETEEN YEARS. Ind. Agr. Expt. Sta. Ann. Rpt. (1898/99) 12: 54–58.

EXAMPLES OF FOOTNOTES

Dodge, B. O. A ROOT-ROT DISEASE OF APPLE SEEDLINGS. Paper presented at 71st Meeting, Amer. Assoc. Adv. Sci., Baltimore, Dec. 1918. [Not published. Title in Program, p. 32.]

Smith, E. F. BACTERIA IN RELATION TO PLANT DISEASES. 1: 92, 1905; 2: 69, 1911. Washington, D. C. 1905–1911. (Carnegie Inst. Wash. Pub. 27.)

EXAMPLE OF SYNONOMY

Citrus articulata Willd., 1826, Spreng., Syst. Veg., 3: 334.

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UNITED STATES DEPARTMENT OF AGRICULTURE
MISCELLANEOUS PUBLICATION NO. 4
WASHINGTON, D. C. SEPTEMBER, 1927

PRESENT TRENDS IN HOME SEWING[1]

By RUTH O'BRIEN, *Textile Chemist in Charge, and* MAUDE CAMPBELL, *Assistant Specialist in Clothing, Textiles and Clothing Division, Bureau of Home Economics*

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The practices of home makers in regard to home sewing are obviously in process of change, although there are no data available which show conclusively the tendencies which may be developing. The subject is of such economic importance that it is forcing itself upon the attention of many different groups. Not only those industrial organizations which deal directly with the production and sale of fabrics and clothing but also those firms which handle notions, patterns, domestic sewing machines, and other commodities connected with home sewing have a direct interest in the matter. In some instances attempts are being made to stimulate either home sewing or the purchase of ready-made garments, but often these are promoted with little knowledge of the forces which are favoring or inhibiting them.

It is unfortunate that data are not available showing the consumption of textile yardage by home makers. A recent study (*8*) [2] made by the bureau of business research, Harvard University, gives indicative but not conclusive figures. The report gives the record of sales from 10 department stores for the period from 1911 to 1925, inclusive. The total sales of ready-to-wear merchandise in these stores correspond closely with the total sales of yard goods until 1920. During the years 1921 to 1925, inclusive, there was an upward trend in the sales of ready-to-wear garments, whereas the sales of piece goods showed a marked downward inclination. Sales of cotton piece goods increased rapidly from 1911 to 1920. From

wledgment is hereby made to the State clothing specialists and other extension leaders; members eral Federation of Women's Clubs; college, university, and high-school teachers; and individuals o gather the data in this survey. So many of these persons assisted that lack of space makes s publish their names.

[2] made by italic numbers to "Literature cited," p. 15.

1921 through 1925 there was a marked downward trend. Sales of silks and velvets increased through 1920 almost as rapidly as the sales of cotton. There was a similar decline in 1921, but the trend from 1921 through 1925 was generally upward. On the other hand, sales of woolen and worsted piece goods increased through 1920, but not so markedly as did the sales of cotton. From 1921 to 1925, inclusive, they decreased but more gradually than in the case of cotton.

PREVIOUS STUDIES OF HOME SEWING

The first study on record which definitely attempted to report the amount of home sewing being done was made during 1912 to 1914 by Leeds (*10*), who questioned 60 families living in Pennsylvania. Fifteen of these families made no clothing in the home, 50 bought all or most of their clothing ready-made, all bought more than half ready-made, and over one-half of the families reported that they made more than "a few" garments at home (*10, p. 51*). The garments mentioned as being made at home most frequently were dresses, shirt waists, petticoats, skirts, hats, and night robes. The clothing made to order was usually women's hats and men's suits, and half a dozen women had tailor-made dresses.

In 1919 a survey was made by the office of cooperative extension work of the United States Department of Agriculture (*11*), covering about 10,000 representative farm homes in rural regions of the 33 Northern and Western States. Of the 9,724 who answered the question concerning home sewing, 86 per cent of those in the eastern portion of the area studied, 94 per cent in the central, and 95 per cent in the western portion reported that they were doing their own sewing. This merely gives the number who did some of their own sewing; it does not indicate the number making most or all of their clothing. The lower proportion doing home sewing in the eastern section, where presumably shopping centers were more accessible, is interesting.

Results of a study of 1,400 families living in 10 counties of Illinois were summarized by Wilkerson (*12*) in 1920. It showed that 20 per cent of the women made all their clothing except tailored suits and coats; 8.6 per cent did not sew; 15.4 per cent made shirts for their husbands; 65.4 per cent made dresses or underwear; and 68.7 per cent of those having children made children's clothing.

In 1922 Brown (*5*) made an investigation regarding clothing habits. Reports were received from about 60 married graduates of home-economics courses, 82 per cent of whom had children. They were living in 18 States. One-third of these women made practically all their children's clothing, even knitted garments; 43 per cent made pajamas and underwear for their husbands; and 31 per cent made shirts for the husbands. Six per cent of these women made none of their own clothes; over three-fourths made their own underwear and at least some of their dresses. Two of them made all of their clothes, even their hats. Fifty per cent professed to enjoy making clothing.

Andrews (*3*) summarizes these studies of Wilkerson and Brown and also gives the results of questioning 30 women home-economics teachers. During the preceding two years some of these teachers had made summer hats, thin silk and cotton waists, cloth (?) [illegible] and wash dresses, and underwear. A larger percentage had [illegible] underwear than had made any of the other garments named.

The studies of Ward, Wilkerson, and Leeds are cited by Harap (*7*) in his summary of the objectives involved in the teaching of construction and care of clothing.

In 1923 and 1924 the extension committee of the textile section of the American Home Economics Association under the chairmanship of Tucker (*1*) made a survey of 4,138 families, most of whom lived on farms and in villages in 16 States.

A similar study reported by Amery (*2*) in 1925 at the annual meeting of the American Home Economics Association and later published by Hastie and Gorton (*9*) was made by the education section of that association. The object of this study was to determine what place clothing construction should have in the school curriculum. Answers to questionnaires were received according to Amery from 2,989 city families in New York, Nebraska, Delaware, and Indiana, and from 1,450 rural families in Delaware, Pennsylvania, Nebraska, New York, and Texas. While this survey shows that little sewing was being done in the city homes considered, Hastie and Gorton (*9, p. 131*) state that "92 per cent of the city women consider it important that girls should know how to construct garments" and "17 per cent of the city women made more clothing in the home than they did three years ago." Of the women living in rural sections, 95 per cent considered that girls should know how to sew, and 65 per cent of these women were doing more sewing than they did three years previously.

RESULTS OF THE PRESENT STUDY

In 1925 and 1926 the division of textiles and clothing of the Bureau of Home Economics cooperated with Tucker in a reorganization and redistribution of her questionnaire. A special effort was made to obtain information concerning urban families, since at that time these had not been approached by any other investigator. Reports were received from 32 States and the District of Columbia, a wider area than had been previously covered in a clothing survey.

Table 1 shows how the general data obtained in this study compare with the results obtained by Tucker and by Hastie and Gorton. All percentages in this table are calculated on the basis of the total number of reports summarized. The size of the cities from which reports were received in the Hastie-Gorton survey are not given, but 2,099 came from South Bend, Ind., a city of over 70,000, according to the United States census of 1920. Only 123 reports of the Tucker survey came from cities with over 5,000 population; 1,116 of the women reporting lived in villages and 2,882 lived on farms. A few did not give the size of their community.

The answers which the Bureau of Home Economics received from cities of over 5,000 have been grouped together. Of these women who reported, 197 lived in towns of 5,000 to 10,000 and 551 lived in cities of 10,000 or over. Of the rural group 668 lived on farms and 427 lived in towns of under 5,000. The results do not give the total amount of home sewing done, but only list some of the different kinds of garments made at home and the percentage of women making each kind.

TABLE 1.—*Proportion of women making certain garments for women and for girls over 14 years of age, and for children, as reported by Tucker (1), by Hastie and Gorton (9), and as found by the Bureau of Home Economics*

	Tucker	Hastie and Gorton		Bureau of Home Economics		
	Rural and village	Rural	City	All communities [1]	Rural and village	Cities over 5,000
Total number of answers	4,138	1,450	2,989	1,981	1,095	748
Garments for women and for girls over 14 years of age:	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
House dresses	90.0	84	14	80.0	87.1	73.9
Summer wash dresses	84.0	78	18	82.1	86.3	79.0
Silk dresses	46.8	50	67	60.9	61.5	62.4
Wool dresses	42.3	61	56	59.2	63.6	54.3
Skirts	25.5	48	11	44.1	48.2	39.7
Blouses	42.6	65	51	41.2	45.3	36.9
Aprons	77.5	91	22	80.4	88.9	72.9
Coats	11.1	8	8	24.4	27.3	21.5
Hats	33.8	15	12	31.9	33.6	29.9
Slips	[2] 83.8	84	21	76.6	81.2	73.4
Petticoats		67	19	58.6	64.7	52.5
Chemises		58	12	46.6	46.8	48.2
Bloomers		84	20	61.9	70.3	51.1
Nightgowns	----------	77	21	79.9	86.3	74.2
Garments for children:						
Cotton dresses	64.9	63	16	34.2	40.0	27.9
Wool dresses	30.7	52	12	27.2	33.2	20.1
Cotton suits	32.5	23	4	17.1	20.4	13.5
Wool suits	26.2	15	3	11.9	14.9	8.6
Shirts or blouses	----------	23	7	17.1	22.2	11.1
Coats	46.0	21	6	23.2	27.5	18.4
Hats	17.6	13	13	14.8	17.2	12.3
Sleeping garments	[3] 61.9	55	15	38.6	45.6	31.2
Drawers or bloomers				34.7	41.0	27.4
Petticoats		[3] 49	[3] 9	31.2	36.3	25.8
Slips				31.0	36.4	25.4

[1] 138 did not give size of community.
[2] Grouped as "Undergarments."
[3] Undergarments and sleeping garments.

The general results from rural and village families in regard to garments made for adults are close in all three surveys, the greatest variation in any two groups being slightly more than 22 per cent for skirts and blouses. It would, therefore, appear that the rural and village families studied by the Bureau of Home Economics were representative and that the factors influencing the home sewing being done by them were typical of present conditions.

The great differences between rural and city families of the Hastie-Gorton survey and also between the city groups of that survey and those of the Bureau of Home Economics survey may be due to the fact that 70 per cent of the city answers of the Hastie-Gorton report came from one city.

The least difference found for any one garment by the different surveys was for silk dresses, which was 15.6 per cent. The variation in wool dresses was 21.3 per cent.

It is difficult to interpret the differences reported in the amount of children's clothing made, since the percentage of families having children and the number of children in each was not determined in all the surveys. Tucker reports the average number of children per family investigated as 2.9 and the average number in the family as 4.02. Hastie and Gorton give no data on the subject. The percentage of families not having children 14 years of age and younger studied in the Bureau of Home Economics survey is given in Table 3, and the size of the families studied is given in Table 5.

The results of the bureau survey, which was made by the questionnaire method, are given in Tables 2 to 9. Blanks were sent to high-school, college, and university teachers, to presidents of women's clubs, and to extension leaders for distribution. The data are compared, whenever possible, with the results obtained by Tucker, since this study was made in cooperation with her and as a continuation of her survey. With the exception of Table 5, which is arranged according to the number of persons in the family, all the tables are arranged according to the size of the community in which the family lived and according to the income which the family received. The size of the community was not stated in 138 reports, and 505 failed to give the income.

GARMENTS MADE AT HOME

In Tables 2, 3, and 4 are shown the percentage of women who stated that they made the garments named for women and for children. In Tables 2 and 3, the percentages are based on the total number of reports summarized from each community and each income group. The percentages in Table 4 are calculated on the basis of the number of families having children 14 years of age and younger. The figures given under "Women not answering this question" in these three tables include those who may not sew, and those who did not answer the question as directed or who may have left it blank through carelessness.

TABLE 2.—*Proportion of women making certain garments for women and for girls over 14 years of age, classified by size of community and by income groups*

	Average number in family	Reports summarized	Women not answering this question	Percentage of women making—															
				House dresses	Summer wash dresses	Silk dresses	Wool dresses	Skirts	Blouses	Aprons	Coats	Hats	Slips	Petticoats	Chemises	Bloomers	Nightgowns	Kimonos
Summary of all reports	No. 4.0	No. 1,981	Per cent 8.9	Per cent 80.0	Per cent 82.1	Per cent 60.9	Per cent 59.2	Per cent 44.1	Per cent 41.2	Per cent 80.4	Per cent 24.4	Per cent 31.9	Per cent 76.6	Per cent 58.6	Per cent 46.6	Per cent 61.9	Per cent 79.9	Per cent 50.9	
Size of community:																			
Rural	4.6	668	6.1	88.1	86.6	60.5	63.8	48.4	46.0	88.8	27.0	34.4	80.9	66.5	42.2	73.6	87.2	51.1	
Under 5,000	3.7	427	7.5	84.9	85.2	62.5	62.7	47.5	42.8	86.1	26.7	32.1	81.4	61.5	53.8	66.6	84.2	50.2	
5,000 to 10,000	3.8	197	8.6	76.6	80.1	65.4	54.8	36.5	36.5	77.1	22.3	31.9	79.1	50.2	45.6	53.2	77.6	47.7	
Over 10,000	3.5	551	9.4	72.8	78.4	61.2	53.9	40.7	36.9	71.1	21.2	29.1	71.1	53.2	49.1	50.1	72.8	50.7	
Not given	4.3	138	24.6	58.6	67.3	49.2	52.1	36.2	32.6	62.3	17.4	29.7	59.4	43.4	36.9	55.0	62.3	38.4	
Income:																			
Under $1,000	3.7	151	8.6	86.7	85.4	53.0	63.6	48.3	41.0	85.4	28.5	35.1	76.1	62.2	40.4	70.8	88.7	44.4	
$1,000 to $1,999	3.6	473	6.5	83.1	84.8	65.8	63.9	48.1	44.1	85.7	27.2	35.9	78.9	63.7	49.0	67.9	84.4	53.8	
$2,000 to $2,999	3.7	387	5.7	83.9	86.4	69.1	65.8	49.3	48.2	83.6	29.7	35.9	80.8	64.2	58.8	64.5	85.7	61.7	
$3,000 to $3,999	4.0	195	7.2	81.9	83.5	64.5	58.9	36.4	42.5	78.8	19.5	27.1	78.8	52.2	43.0	53.8	77.8	50.2	
$4,000 to $4,999	4.1	111	11.7	73.8	77.4	63.9	54.0	36.9	41.4	71.1	30.6	29.7	79.2	49.5	39.6	54.0	73.8	48.6	
$5,000 or over	4.4	159	8.3	72.4	73.7	57.8	50.8	34.9	29.8	77.5	12.7	24.1	73.7	54.0	43.2	48.9	70.5	45.1	
Not given	4.3	505	13.9	75.6	78.8	51.5	52.5	42.8	36.2	75.4	20.8	29.1	71.3	54.5	41.2	60.0	74.3	44.7	

From the summary in Table 2 it is seen that 80 per cent or more of the women made house dresses, summer wash dresses, aprons, and nightgowns. In general more of the women living in the smaller communities than of those in the larger places made these garments. The exceptions were the number of women making kimonos, chemises, and silk dresses. The percentage that made silk dresses varies only slightly in any community. Many more in all community groups

made house dresses and summer wash dresses than made silk dresses and wool dresses. As many made silk dresses as made wool dresses, except in the rural communities and in the case of those who did not report the size of the community.

In the classification by income groups the largest percentages of women making most of the garments are in the $2,000 to $2,999 group, the only exception being those of the women making house dresses, nightgowns, bloomers, coats, and aprons. The highest percentage making the first three of these garments is in the "Under $1,000" group. Apparently size of family is not an influencing factor in this grouping. However, Table 5 shows that as the size of family increases a larger percentage of women made more kinds of garments. Therefore, if the size of family were a constant factor in Table 2, the percentages in the higher income groups might tend to be even lower. The data in Table 2 show that in general a larger percentage of those in the lowest income group than those in the highest income group made the garments.

The percentage of women making a certain number of the garments named are given in Table 3, which is based on the 1,981 reports used for Tables 1 and 2.

TABLE 3.—*Proportion of women, classified by size of community and by income groups, making garments for women, for girls over 14 years of age, and for children*

	Average number in family	Reports summarized	Percentage of women making garments for women and for girls over 14				Percentage of women making children's garments				
			Women not answering	1 to 5 kinds	6 to 10 kinds	11 to 15 kinds	Women not answering	Families with no children under 15	1 to 4 kinds	5 to 8 kinds	9 to 12 kinds
		Number	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Summary of all reports	4.0	1,981	8.9	13.5	36.6	40.9	53.0	49.1	13.9	20.7	12.2
Size of community:											
Rural	4.6	668	6.1	9.1	39.2	45.1	40.1	37.6	15.3	27.1	17.0
Under 5,000	3.7	427	7.5	11.9	34.2	46.3	54.5	53.4	13.1	19.4	12.9
5,000 to 10,000	3.8	197	8.6	18.3	36.0	37.0	51.7	45.7	17.2	20.3	10.6
Over 10,000	3.5	551	9.4	18.6	35.8	35.8	63.7	60.3	12.9	15.9	7.2
Not given	4.3	138	24.6	11.6	34.8	29.0	68.8	52.2	8.7	13.0	9.4
Income:											
Under $1,000	3.7	151	8.6	11.9	41.0	38.4	48.3	43.7	14.6	24.5	12.6
$1,000 to $1,999	3.6	473	6.5	10.6	35.9	46.8	50.6	48.8	12.9	20.9	15.4
$2,000 to $2,999	3.7	387	5.7	10.6	31.2	52.4	50.8	51.2	12.6	21.9	14.4
$3,000 to $3,999	4.0	195	7.2	17.9	38.9	35.8	51.2	47.7	14.8	25.1	8.7
$4,000 to $4,999	4.1	111	11.7	18.0	31.5	38.7	56.7	40.6	16.2	22.5	4.5
$5,000 or over	4.4	159	8.3	24.1	38.1	30.5	57.2	52.8	18.4	15.9	9.5
Not given	4.3	505	13.9	12.9	40.0	33.3	57.0	48.7	13.5	18.0	11.5

The largest percentage of women making garments for women and girls made 11 to 15 kinds, and over one-third made 6 to 10 kinds. In other words over 75 per cent of the women were making 6 or more kinds of garments. The largest percentage making children's garments made 5 to 8 kinds, while the percentages making 1 to 4 kinds and those making 9 to 12 kinds are practically equal. Approximately half of the families had no children under 15 years of age, which probably accounts for the small percentages of women making chil-

dren's garments. However, many of the women made garments for children when there were no children in the family.

As the size of the community increases the percentage of women making from 1 to 5 kinds of garments for women and for girls over 14 years of age increases. The largest percentages of women making the most different kinds of garments for women and girls were in the rural districts and the small towns. The size of the community seems to have little or no effect on the percentage making from 6 to 10 kinds of garments but causes the greatest variation in the groups making 1 to 5 kinds.

In the classification by income the percentage of women making 1 to 5 kinds of garments for women and for girls over 14 years old increases with the income. Approximately half of the women in the $1,000 to $1,999 and the $2,000 to $2,999 groups made 11 to 15 kinds. Throughout all the income groups there was least variation in the percentages making 6 to 10 kinds.

In all groups the percentage of women making children's clothes decreases as the size of the community increases. Classified by income groups the number answering in most cases is too small to afford any definite comparisons.

In Table 4 is given the percentage of women having children under 15 years of age and younger who made the children's garments named in the questionnaire.

TABLE 4.—*Proportion of women making garments for children under 15 years of age, classified by size of community and by income groups, and based on the number of families having children under 15 years of age*

	Number of families with children	Women not answering this question	Percentage of women making garments—											
			Rompers	Cotton dresses	Wool dresses	Cotton suits	Wool suits	Shirts	Coats	Hats	Night garments	Drawers or bloomers	Petticoats	Slips
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Summary of all reports	1,008	19.3	36.1	59.8	48.3	30.5	21.5	30.2	42.0	25.6	68.0	60.5	54.2	53.0
Size of community:														
Rural	417	13.9	37.6	63.3	54.9	33.8	27.1	38.8	45.6	27.6	74.8	66.2	57.6	58.0
Under 5,000	199	17.1	35.7	64.8	50.8	31.2	19.1	30.2	46.2	27.1	71.4	63.3	57.3	56.3
5,000 to 10,000	107	21.5	35.5	53.3	39.3	32.7	15.9	27.1	38.3	20.2	59.8	54.2	49.5	46.7
Over 10,000	219	22.8	35.6	58.0	42.5	25.6	18.7	19.6	38.4	23.3	63.9	55.7	53.0	50.7
Not given	66	45.5	30.3	39.4	33.3	19.7	12.1	15.2	24.2	15.2	40.9	42.4	34.8	28.8
Income:														
Under $1,000	85	17.6	35.3	50.5	50.6	30.6	20.0	36.5	41.2	21.2	72.9	61.2	50.6	47.1
$1,000 to $1,999	242	14.5	43.4	65.7	57.0	36.8	24.8	36.8	51.2	29.8	73.5	66.1	61.6	55.4
$2,000 to $2,999	189	12.7	43.9	64.0	48.7	40.2	29.6	34.4	44.4	32.8	81.5	66.7	59.3	59.3
$3,000 to $3,999	102	14.7	42.2	63.7	46.1	34.3	20.6	23.5	52.9	23.5	66.7	59.8	54.9	51.0
$4,000 to $4,999	56	28.6	14.3	46.4	28.6	17.9	14.3	19.6	25.0	12.5	60.7	46.4	42.9	46.4
$5,000 or over	75	20.0	36.0	65.3	44.0	18.7	12.0	17.3	29.3	20.0	58.7	61.3	60.0	57.3
Not given	259	29.0	26.3	52.1	45.6	22.0	17.8	27.4	34.7	23.2	50.0	53.7	45.2	49.0

From the summary it will be noted that a larger percentage of women made night garments than made any other garment. It is also shown that 42 per cent made coats and 25 per cent made hats for their children. In this group a much higher percentage (19.3) of the women than in Table 2 (8.9) failed to answer the question.

Fewer women in the cities than in the rural districts were making the children's garments. In general the percentage making each garment decreases as the size of the community increases.

Classified by income, the highest percentage making each garment, except coats, is found either in the $1,000 to $1,999 group or in the $2,000 to $2,999 group. The latter group has a larger number of the high percentages.

RELATION OF HOME SEWING TO SIZE OF FAMILY

Table 5 gives the number of women making the garments listed in Tables 2 and 4 for women and children, classified according to the size of the family, together with the number making the five garments for men listed in the questionnaire, namely, coats, shirts, trousers, pajamas, and bathrobes. There were a few families having more than nine members, but the number was too small for comparison.

TABLE 5.—*Relation between size of family and number of different garments made at home for men, women, and children*

	Number of families	Women not answering this question	Percentage of women making—			
			1 to 8 kinds	9 to 16 kinds	17 to 24 kinds	25 to 32 kinds
Summary of all reports	1,926	*Per cent* 6.5	*Per cent* 24.8	*Per cent* 41.1	*Per cent* 21.5	*Per cent* 0.1
Number of persons in family:						
1	101	10.9	34.7	51.5	3.0	0.0
2	341	9.4	39.0	44.3	6.5	0.9
3	440	7.0	25.9	43.9	18.6	4.5
4	444	5.0	22.5	40.9	24.1	7.4
5	262	6.5	20.2	40.1	25.6	7.6
6	173	2.9	13.3	34.1	38.7	11.0
7 to 9	165	4.2	12.1	29.7	40.0	13.9

From the summary in Table 5 it is seen that nearly 70 per cent of the women were making 9 or more kinds of garments. As the size of the family increases the percentage making 17 to 24 and 25 to 32 kinds of garments increases, while the percentage making 1 to 8 and 9 to 16 kinds decreases. In other words, the more members there were in the family, the more kinds of garments were made at home.

In the data collected from this survey it was also found that 22.2 per cent of the women were making shirts, 23.2 per cent were making pajamas, and 35.6 per cent were making one or more kinds of garments for men. Tucker reported that 36.8 per cent of the women were making shirts and 25.8 per cent were making pajamas for their husbands or adult boys.

REASONS FOR MAKING GARMENTS AT HOME

The percentage of women who sewed because of some of the reasons suggested in the questionnaire are given in Table 6. The percentages are based on the number of women in each group who answered this question.

TABLE 6.—*Reasons for making garments at home given by women, classified by size of community and by income groups*

	Women answering this question	Good stores for ready-made garments inaccessible	Better materials in homemade garments	Lower cost of homemade garments	Homemade garments more nearly meet individual needs
Summary of all answers	*Number* 1,697	*Per cent* 7.8	*Per cent* 75.4	*Per cent* 90.2	*Per cent* 54.9
Size of community:					
Rural	572	13.7	78.4	93.3	50.8
Under 5,000	380	8.9	76.8	89.2	54.2
5,000 to 10,000	172	1.7	73.8	87.7	55.8
Over 10,000	487	2.5	74.0	88.4	61.0
Not given	86	7.0	62.6	91.6	51.0
Income:					
Under $1,000	126	15.9	73.7	94.4	47.6
$1,000 to $1,999	415	6.5	77.8	92.8	52.5
$2,000 to $2,999	363	9.4	80.9	92.5	64.3
$3,000 to $3,999	178	4.5	79.1	92.6	57.2
$4,000 to $4,999	97	3.1	76.2	86.5	51.5
$5,000 or over	145	5.5	62.0	73.7	62.7
Not given	373	8.9	71.6	90.4	47.9

In the summary it is shown that 90.2 per cent of all the women answering the question sewed because of lower cost and that 75.4 per cent of them sewed because of better materials in homemade garments.

The greatest variation is in the percentage of women, classified by size of community, answering on "Good stores for ready-made garments inaccessible." In the rural sections 13.7 per cent gave this reason, as compared with 1.7 per cent in cities from 5,000 to 10,000 and 2.5 per cent in cities over 10,000. There is only a slight variation in the percentages given under the reasons "Better materials in homemade garments" and "Lower cost of homemade garments." Those in rural communities were apparently not so much concerned about suiting individual needs as were those in the cities. This reason seems to gain in importance as the size of the community increases.

More of those having the lowest income sewed because of lower cost of homemade garments than did those having the highest income, there being a difference of 20.7 per cent. More (11.7 per cent) of those having the lowest income sewed because of better materials than did those having the highest income. The group with an income from $2,000 to $2,999 seemed to be most interested in satisfying individual needs and in having better materials.

Studies by Baker (*4*) and Glanton (*6*) attempted to evaluate the savings realized and the time spent in home sewing. They showed that the amount saved depended upon the kind and quality of the garment made.

It is to be regretted that the questionnaire did not ask how many sewed because they enjoy it. This reason was volunteered by many women and indicates that not all are sewing entirely because of economic reasons. Other reasons volunteered were: Homemade clothing is made better and wears better; it fits better; the style, design, and color combinations are more attractive; and the garments have more individuality.

In the Tucker survey three questions were asked in regard to why sewing was done at home. More than 80 per cent found it an economy, over 50 per cent sewed because they enjoyed it, and more than 50 per cent said they were able to have clothes that pleased them better than ready-made garments. These percentages are based on the total number of reports summarized. Other reasons corresponding to those given in the bureau questionnaire were volunteered.

DIFFICULTIES WITH HOME SEWING

A summary of the answers to the queries on difficulties in home sewing is given in Table 7. Only the women who answered the question are counted. The first four difficulties might be classified under "selection" and the last four under "construction." In most cases several difficulties were checked by each person answering.

TABLE 7.—*Difficulties in home sewing given by women, classified by size of community and by income groups*

	Women answering this question	Choosing becoming materials	Choosing becoming and practical designs	Choosing satisfactory patterns	Recognizing good value in materials	Using patterns	Altering patterns	Fitting	Finishing
	Number	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Summary of all answers	1,368	24.9	27.8	23.8	19.2	10.2	24.6	31.1	22.1
Size of community:									
Rural	452	37.6	38.7	30.7	21.9	13.7	24.8	30.5	25.4
Under 5,000	312	20.8	26.0	20.2	17.3	8.7	22.4	32.1	17.3
5,000 to 10,000	146	21.2	25.3	22.6	18.5	6.2	27.4	34.9	24.7
Over 10,000	395	16.2	19.0	19.5	18.7	8.6	25.3	30.9	21.5
Not given	63	15.9	19.1	20.7	12.7	11.1	22.3	22.3	20.7
Income:									
Under $1,000	99	45.5	44.4	38.4	22.2	13.1	23.2	29.3	27.3
$1,000 to $1,999	335	27.8	31.7	23.6	20.6	12.6	27.2	33.5	23.9
$2,000 to $2,999	300	26.6	29.3	24.3	19.6	10.3	26.6	32.6	23.6
$3,000 to $3,999	151	19.2	24.5	20.5	21.2	7.9	23.8	37.1	24.5
$4,000 to $4,999	83	14.5	13.3	22.9	22.9	13.3	25.3	28.9	22.9
$5,000 or over	108	12.0	16.7	17.6	13.9	3.7	20.4	25.0	17.6
Not given	292	23.3	26.0	22.6	15.7	8.9	21.5	27.0	17.1

According to the summary figures in Table 7, the most outstanding difficulty of all was fitting, and the next greatest problem was that of choosing becoming and practical designs. The difficulty which was found the least number of times was using patterns.

In general, as the size of the community increases, the percentage of women having difficulties with selection becomes smaller. The percentages of those having difficulties with construction do not vary greatly.

Classified by income groups, the percentages of women having difficulties with selection in general become smaller as the income increases, and the percentages having construction difficulties vary only slightly and not in a decreasing order. Some of the most outstanding percentages are those in the "Under $1,000" group. Of these, 45.5 per cent had difficulty choosing becoming materials, 44.4 per cent had difficulty in choosing becoming and practical designs, and 38.4 per cent found it difficult to choose satisfactory patterns.

The next highest percentage shown in Table 7 is the 37.1 per cent in the $3,000 to $3,999 group who reported difficulty in fitting.

The Tucker survey reported the following difficulties, the percentages being based on the total number of schedules summarized.

Difficulty reported:	Per cent
Altering patterns	52. 2
Choosing becoming designs	51. 1
Fitting	50. 3
Choosing satisfactory patterns	49. 3
Choosing suitable materials	46. 4
Finishing	45. 0
Using patterns	35. 3
Cutting	10. 9
Preparing material for cutting	7. 4

In the Tucker survey, when asked for other difficulties, 136 women named "fitting sleeves," and 22 said that the most trouble they had was in fitting. This reaffirms the statement that fitting is one of the outstanding difficulties women have in home sewing.

SEWING MACHINES OWNED AND ATTACHMENTS USED

The percentage of women who owned sewing machines and the proportion who used attachments are given in Table 8. In some cases the kind of power used was not given; in others it was stated that the machine was operated by both foot and motor power. Because many of the women not owning a sewing machine said they used certain attachments, the percentages using attachments are based on the total number of reports summarized in each group. The percentage of women who said they did not own a sewing machine can be obtained by subtracting the sum of the percentage owning a machine and the percentage of those not answering from 100.

The summary shows that practically 90 per cent of all reporting had sewing machines and that 13 per cent of all reporting operated their machines by motor power. Practically 40 per cent did not answer the question on attachments. The hemmer and the ruffler were used more than any other attachments. The braider was used the least of the four attachments listed in the table. All others were mentioned by so few that it seemed inadvisable to tabulate them.

The percentage of women owning sewing machines decreases as the size of the community increases. The percentage having foot-power machines decreases and the percentage having motor-power machines increases with the increased size of the community. The highest percentage (25.4) having motor-power machines lived in communities of from 5,000 to 10,000 population.

More than one-third of all community groups failed to answer the question concerning the use of attachments. This may signify that a large number of these women did not use them. The percentage using the attachments named is slightly higher in the rural communities and in communities under 5,000 than in the two larger community groups.

TABLE 8.—*Sewing machines owned and attachments used by women, classified by size of community and by income groups*

	Reports	Women not answering this question	Women owning—		
			Foot, hand, and motor-power sewing machines	Foot-power sewing machines	Motor-power sewing machines
	Number	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Summary of all reports	1,981	1.8	89.9	75.3	13.0
Size of community:					
Rural	668	1.3	92.7	87.2	1.0
Under 5,000	427	1.4	92.2	77.5	14.5
5,000 to 10,000	197	3.5	88.2	62.4	25.4
Over 10,000	551	1.1	85.6	65.3	21.4
Not given	138	5.8	87.6	68.1	15.2
Income:					
Under $1,000	151	2.6	92.0	87.4	2.0
$1,000 to $1,999	473	1.5	85.2	75.1	6.8
$2,000 to $2,999	387	1.5	86.9	73.3	13.2
$3,000 to $3,999	195	1.0	92.7	70.1	22.0
$4,000 to $4,999	111	1.8	92.7	66.6	27.9
Over $5,000	159	0.0	95.3	66.7	29.8
Not given	505	3.0	93.1	80.4	10.1

	Women not answering this question	Women using—					
		No attachments	All attachments	Ruffler	Tucker	Braider	Hemmer
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Summary of all reports	39.8	12.8	5.4	28.5	21.3	6.8	32.6
Size of community:							
Rural	39.6	10.4	5.1	31.9	19.4	7.6	34.3
Under 5,000	34.9	13.8	6.8	30.0	26.9	7.5	34.2
5,000 to 10,000	39.0	15.2	6.1	25.4	17.7	6.1	34.0
Over 10,000	37.6	15.0	4.3	28.1	23.9	6.3	33.1
Not given	64.4	8.7	5.8	13.8	7.2	2.9	14.5
Income:							
Under $1,000	36.4	9.9	2.6	34.4	17.9	6.6	39.1
$1,000 to $1,999	35.9	13.9	4.6	32.7	22.2	8.9	34.2
$2,000 to $2,999	31.0	13.9	6.2	33.5	29.9	9.3	37.9
$3,000 to $3,999	32.3	16.9	1.5	34.3	29.7	6.1	40.4
$4,000 to $4,999	26.1	16.2	11.7	28.8	26.1	5.4	34.2
Over $5,000	41.9	16.5	2.5	29.2	17.8	8.3	32.4
Not given	56.6	8.3	7.3	16.6	11.7	3.0	21.8

Beginning with the group having an income of $1,000 to $1,999, the percentage owning sewing machines increases with the size of the income. The percentage using motor power increases steadily with the increase of the income, and the percentage of those using foot-power machines decreases with the increase in income.

The question on attachments was not answered by 26 per cent or more of all income groups. The highest percentages reporting that they used none are found in the three highest income groups. The highest percentage reporting use of all attachments is in the $4,000 to $4,999 group. However, this group has the least number of women answering, and the result may not, therefore, be conclusive The highest percentage in any group reporting the use of an attachment is the 40.4 per cent in the $3,000 to $3,999 group using the hemmer.

From these figures, it seems that a large part of the labor-and-time-saving equipment of the sewing machines is unproductive and that training and encouragement in the use of attachments would greatly increase efficiency in home sewing. Ninety-five per cent of the 9,560 families surveyed by Ward (*11*), 97.2 per cent of those reported by Tucker (*1*), and 98 per cent of the rural families and 92 per cent of the city families surveyed by Hastie and Gorton (*9*) had sewing machines in their homes.

REASONS FOR PURCHASING GARMENTS READY-MADE

The reasons given for buying clothes ready-made are summarized in Table 9. Only the women who answered the question are included in these percentages. In most reports more than one reason was checked.

TABLE 9.—*Reasons for purchasing garments ready-made given by women, classified by size of community and by income groups*

	Women answering this question	Better style and design in ready-made garments	Ready-made garments save time and energy	Unable to make clothes at home
Summary of all answers	*Number* 1,478	*Per cent* 69.4	*Per cent* 72	*Per cent* 25.9
Size of community:				
Rural	453	66.1	67.2	29.8
Under 5,000	334	74.4	65.4	28.5
5,000 to 10,000	163	72.3	72.3	23.3
Over 10,000	453	69.6	82.2	22.8
Not given	75	61.6	69.7	16.1
Income:				
Under $1,000	89	62.7	59.4	33.6
$1,000 to $1,999	342	68.3	66.6	26.9
$2,000 to $2,999	315	69.1	74.5	25.7
$3,000 to $3,999	165	73.9	81.2	20.6
$4,000 to $4,999	90	77.7	74.7	25.3
$5,000 or over	141	71.6	80.1	19.9
Not given	327	66.7	69.5	28.5

According to the summary figures, a large percentage of the women bought garments ready made to save time and energy and to get better style and design. The factor having the least influence was "Unable to make clothes at home." Other reasons volunteered are: Difficult to fit self, poor health, not skilled with silk and wool, get full effect with ready-mades, better tailoring, difficult to get yard goods and trimmings, and unable to get a good dressmaker.

In the classification by communities it is shown that a large percentage bought ready-made garments for better style and design and to save time and energy. The variation is greater on the latter reason, and the percentage giving this answer increases with the size of the community. A few more women in the rural communities than in the cities reported that they were unable to make their clothing.

As the income increases a larger percentage buy because of better style and design and also because ready-made garments save time and energy. More women in the low-income groups than in the high-income groups buy because they were unable to make garments.

The Tucker survey reports that 56.6 per cent of the women bought ready-made garments because of less trouble, 50.4 per cent because of greater satisfaction, 36.5 per cent because they found it an economy, and 12.7 per cent because they did not know how to sew. In this survey a question was also asked regarding the difficulties women have in buying clothing. Of the total number of replies summarized, 49.2 per cent reported difficulty in choosing suitable styles, 43.9 per cent in choosing suitable and becoming materials, 42.4 per cent in choosing durable materials, 40.1 per cent in choosing becoming colors, 30.5 per cent in choosing good designs, and 29.4 per cent in recognizing good values. In addition to these difficulties 351 of the 4,138 women said they could not find good materials at a reasonable price, 226 reported that they could not find styles for the stout person, and 158 said they had trouble in getting fitted. A few others reported that they had trouble in obtaining good design and material at moderate prices, in judging fast colors, and in finding cheap material that would look well and launder well.

In the bureau survey, 76.1 per cent of all women reporting said that they remade garments for men, women, or children. Ten per cent more of those living in the rural communities than of those living in the city remade garments (rural, 81.1 per cent; city, 71 per cent), and practically 10 per cent more of those with an income of under $1,000 (80.8 per cent) than of those with an income of $5,000 or over (71.8 per cent) reconstructed garments.

Tucker found that 52 per cent of the total number reporting reconstructed garments for children, 51.8 per cent for themselves, and 3 per cent for their husbands.

CONCLUSIONS

A large percentage of the women reached by this survey were still making many garments for women and children. More than two-thirds of the women stated that they were making nine or more of the kinds of garments for men, women, and children listed in this survey. More of those living in the smaller communities than of those living in the larger communities made these garments. A larger percentage of those having a low income than of those having larger incomes made the garments named; however, the highest percentages appeared in the majority of cases in the $2,000 to $2,999 income group.

The more persons there were in the families studied, the more different kinds of garments were being made in the home.

Fitting was one of the greatest difficulties which the women said they encountered in making garments. Others which were nearly as troublesome were altering patterns and the choosing of becoming materials, satisfactory patterns, and becoming and practical designs.

A high percentage of women owned sewing machines, but only a low percentage used all of the attachments. The hemmer was used the most, but less than one-third of the women took advantage of that attachment.

A large percentage of the women stated that they reconstructed clothing for some member of the family.

The reasons given for buying ready-made garments were to save time and energy, to get better style and design, and to get greater

satisfaction, while the principal reason given for making garments at home was to lower the cost. Another reason given for sewing at home by a large number was to get materials of better quality.

As long as the woman at home has no direct source of income and her chief duty is in caring for the home and its occupants, she will, no doubt, consider that making at least a part of the clothing for the family is a wise way of "stretching" the family income. A fact which should not be overlooked is that many women admitted they sewed at home because they enjoyed it. One of the best avenues and often the only one which women have for expressing and developing their creative ability is in making their own clothing or that of their family. No doubt women of the future will continue to exercise this ability because they find it a joy and satisfaction.

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ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

March 7, 1928

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UNITED STATES DEPARTMENT OF AGRICULTURE

LIST OF TECHNICAL WORKERS IN THE DEPARTMENT OF AGRICULTURE, AND OUTLINE OF FUNCTIONS OF MAJOR BRANCHES OF THE DEPARTMENT

1927

OFFICE OF PERSONNEL AND BUSINESS ADMINISTRATION
MISCELLANEOUS PUBLICATION No. 5

UNITED STATES DEPARTMENT OF AGRICULTURE
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WASHINGTON, D. C. JULY 1, 1927

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1927

Compiled in the Office of
Personnel and Business Administration

UNITED STATES
GOVERNMENT PRINTING OFFICE
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KEY TO ABBREVIATIONS

Acct., Accounts, Accountant.
Activ., Activities.
Admin., Administration, Administrative, Administrator.
Agr., Agricultural, Agriculturist.
Agron., Agronomist.
Agt., Agent.
An., Animal.
Apicult., Apicultural, Apiculturist.
Arbor., Arboriculture, Arboriculturist.
Assoc., Associate, Association.
Asst., Assistant.
Atty., Attorney.
Aud., Auditor, Auditing.
Bact., Bacteriology, Bacteriological, Bacteriologist.
Bibl., Bibliography, Bibliographical, Bibliographer.
Biochem., Biochemical, Biochemist.
Biol., Biological, Biologist.
Biophys., Biophysical, Biophysicist.
Bot., Botany, Botanical, Botanist.
Bur., Bureau.
Bus., Business.
Chem., Chemistry, Chemical, Chemist.
Co., County.
Coll., College.
Collab., Collaborator.
Comn., Commission.
Comr., Commissioner.
Const., Construction.
Consult., Consulting, Consultant.
Coop., Cooperation, Cooperative, Cooperator.
Cytol., Cytological, Cytologist.
Dem., Demonstration.
Dendrol., Dendrologist.
Dep., Deputy.
Dept., Department.
Dir., Director.
Dist., District.
Div., Division.
Drain., Drainage.
Ecol., Ecologist.
Econ., Economic, Economics, Economist.
Ed., Editorial, Editor.
Engr., Engineer, Engineering.
Ent., Entomology, Entomological, Entomologist.
Equip., Equipment.
Erad., Eradication.
Exam., Examiner.
Exec., Executive.
Exp., Experiment, Experimental.
Expl., Explorer.
Ext., Extension.
Fert., Fertilizers.
For., Forest, Forestry, Forester.
Forecr., Forecaster.
Geol., Geologist, Geological.
Hdqrs., Headquarters.
Hort., Horticulture, Horticultural, Horticulturist.
Husb., Husbandry, Husbandman.
Hwy., Highway.
Illustr., Illustrator.
Ind., Industry.
Insp., Inspection, Inspector.
Inv., Investigations, Investigator.
Irrig., Irrigation.
Jr., Junior.
Lab., Laboratory, Laboratorian.
Libr., Library, Librarian.
Log., Logging.
Mfg., Manufacturing.
Mech., Mechanic, Mechanical.
Med., Medical.
Met., Meteorology, Meteorological, Meteorologist.
Mgr., Manager.
Mgt., Management.
Mkt., Market, Marketing.
Microan., Microanalyst.
Micros., Microscopist.
Misc., Miscellaneous.
Mycol., Mycologist.
Nat., National.
Nematol., Nematologist.
Nutr., Nutrition.
Off., Office, Officer.
Oper., Operations.
Org., Organic, Organization.
Parasit., Parasitology, Parasitologist.
Path., Pathology, Pathological, Pathologist.
Pharmacol., Pharmacology, Pharmacologist.
Phys., Physical, Physicist.
Physiol., Physiology, Physiological, Physiologist.
Pl., Plant, Planting.
Pomol., Pomological, Pomologist.
Prod., Predatory.
Prin., Principal.
Prod., Production, Products.
Prop., Propagation, Propagating, Propagator.
Pubs., Publications.
Quar., Quarantine.
Reserv., Reservation, Reservations.
Sci., Scientific, Scientist.
Secy., Secretary.
Silv., Silviculture, Silvicultural, Silviculturist.
Sociol., Sociology.

Note.—The asterisk (*) following names in "List of Workers" is used to indicate married women (Mrs.).

Spec., Specialist.
Sr., Senior.
Sta., Station.
Stat., Statistics, Statistical, Statistician.
Substa., Substation.
Supt., Superintendent.
Supvr., Supervisor.
Surv., Survey, Surveyor.
Tech., Technical, Technician.
Technol., Technology, Technologist.
Transp., Transportation.
Univ., University.
Util., Utilization.
Vet., Veterinary, Veterinarian.
Warch., Warehouse, Warehousing.
Zool., Zoology, Zoologist.

Note.— The asterisk (*) following names in "List of Workers" is used to indicate married women (Mrs.).

BRIEF OUTLINE OF PRINCIPAL FUNCTIONS OF MAJOR BRANCHES OF UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY

The Secretary of Agriculture is charged with the work of promoting agriculture in its broadest sense. He exercises general supervision and control over the affairs of the department and formulates and establishes the general policies to be pursued by its various branches. The general administrative staff of the department comprising the "Office of the Secretary" includes, in addition to the Secretary's immediate office, the offices of the Assistant Secretary, the Directors of Scientific, Regulatory, and Extension Work, the Director of Personnel and Business Administration, the Director of Information, and the Solicitor. The Assistant Secretary assists the Secretary in the general supervision of the work of the department and acts for the Secretary in his absence. Each of the five directors, reporting directly to the Secretary, has general supervision over all the work of the department of the type which the title of his position would imply. The Office of the Secretary as at present organized includes, in addition to the general administrative branches mentioned, the Office of Information, Office of Experiment Stations, Extension Service, the Library, and the Office of the Solicitor.

OFFICE OF PERSONNEL AND BUSINESS ADMINISTRATION

This office has general direction and supervision of the personnel and of the business operations of the department as a whole, including the coordination and improvement of such business activities of the various bureaus and offices of the department as personnel administration, organization, budget and fiscal matters, purchases and supplies, traffic, housing, and care of buildings and equipment. This office conducts the business of the department with the Civil Service Commission, the Personnel Classification Board, the Employees' Compensation Commission, the Bureau of Efficiency, the Bureau of the Budget, the General Accounting Office, the retirement division of the Pension Bureau, the various boards operating under authority of the chief coordinator, and similar agencies.

OFFICE OF INFORMATION

The Office of Information supervises the expenditure of the appropriations for printing and binding for the department; conducts all business of the department transacted with the Government Printing Office; has general supervision of all editing, printing, indexing, illustrating, binding, and distribution of publications, and the maintenance of mailing lists; maintains an addressing, duplicating, and mailing section to serve the various bureaus of the department. This office secures the circulation in popular form of the discoveries and recommendations of the scientists, specialists, and field workers of the department; gives out to the public press agricultural facts taken from publications and official orders, and also from oral statements of specialists, this material being presented in such form as to attract public attention, be easily understandable, and lead to the adoption of methods recommended; keeps in close touch with correspondents and other writers, providing suggestions and material for articles. It also furnishes daily, through broadcasting from many stations in all parts of the United States, authentic information of practical use to farmers and others concerning the discoveries made by the department and the farm practices recommended by it; answers by radio questions in all fields of agriculture and home economics; and furnishes special information on gardening to boys and girls.

LIBRARY

The Department Library, with its branch libraries in the various bureau, contains approximately 200,000 volumes on agriculture and the related sciences and receives currently 3,300 periodicals.

The dictionary card catalogue of the main library, containing more than a half million cards, is a record of the book resources of the whole department. It is supplemented by several extensive special indexes which are maintained by the various bureau libraries. These together form the most comprehensive bibliography of agriculture and the related sciences available in the United States.

The library lends its books for purposes of research to other libraries and institutions throughout the country, especially to the State agricultural colleges and experiment stations. It also furnishes bibliographical assistance and endeavors in various other ways to serve as the national agricultural library.

OFFICE OF EXPERIMENT STATIONS

The Office of Experiment Stations exercises supervision over the operations of the State agricultural experiment stations under Federal appropriations authorized by the Hatch, Adams, and Purnell Acts for research, and affords such advice and assistance as will best promote the efficiency of these activities. It also collects and disseminates information regarding similar institutions throughout the world. The experiment stations of the Department of Agriculture in Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands are also conducted under the general direction of this office.

EXTENSION SERVICE

This service cooperates with the State agricultural colleges in their plans and expenditures for extension work in agriculture and home economics under the Smith-Lever Act, and acts as an agency for coordinating the extension activities of the several bureaus of the department with similar work carried on by the State agricultural colleges. It conducts demonstrations on reclamation projects to assist settlers in making a success of their farm enterprises. It also has charge of the preparation, installation, and display of agricultural exhibits at State, interstate, and international fairs and of the motion-picture activities of the department.

WEATHER BUREAU

The Weather Bureau has charge of the forecasting of the weather; the issue and display of weather forecast and storm, cold-wave, frost, and flood warnings; the gauging and reporting of river stages; the collection and transmission of marine intelligence for the benefit of commerce and navigation; the collection and furnishing of meteorological information and forecasts, including upper-air observations for the benefit of air navigation; the reporting of temperature and rainfall conditions for agricultural interests; and the taking of such meteorological observations as may be necessary to determine and record the climatic conditions of the United States.

BUREAU OF ANIMAL INDUSTRY

The Bureau of Animal Industry is primarily concerned with the protection and development of the livestock and meat industries of the United States. It conducts scientific investigations of the causes, prevention, and treatment of diseases of domestic animals; investigates the existence of communicable diseases of such animals, and aids in their control or eradication; and carries on investigations and experiments in animal husbandry and in the feeding and breeding of animals. It also is charged with the administration of the meat inspection act, the animal quarantine acts, the 28-hour law, the diseased animal transportation acts, the virus-serum-toxin act, and the act relating to the supervision of the business in interstate commerce of packers, public stockyard markets, and commission men, traders, and other agencies operating in the public stockyards markets of the United States.

BUREAU OF DAIRY INDUSTRY

The Bureau of Dairy Industry conducts investigations of the various problems of dairy production, manufacture, and utilization, and the manufacture and utilization of dairy by-products. New principles and methods developed in the investigational work of the bureau are introduced into the field. The bureau also supervises the inspection of renovated-butter factories.

BUREAU OF PLANT INDUSTRY

The activities of the Bureau of Plant Industry are primarily devoted to plant research and related problems. This work includes the study of destructive plant diseases and the establishment of methods of eradication and control; the improvement of crop, ornamental, or other plants by breeding and selection; the introduction of promising seeds and plants from foreign countries; the improvement of methods of plant production; and the utilization of plants of economic value.

Campaigns to control or eradicate certain plant diseases are conducted in cooperation with the authorities of the States concerned. The 13 States interested in spring-wheat production are cooperating to eradicate the common barberry throughout this area as a means of controlling epidemics of black stem rust of wheat. The New England, Great Lakes, and Northwestern States are cooperating in the eradication of the black currant and related plants as a means of controlling or preventing the spread of blister rust of white pine. The Gulf States are cooperating in the eradication of the canker of citrus trees and fruits.

The regulatory activities are limited to the enforcement of the Federal Seed Act.

In addition to the experimental activities of the bureau at the Arlington (Va.) Experiment Farm, which is immediately adjacent to the District of Columbia, the bureau is operating field stations or laboratories in practically all the major cropping regions of the United States and is maintaining direct cooperative experiments with the State agricultural colleges and experiment stations.

FOREST SERVICE

The Forest Service administers the national forests; cooperates with States in maintaining organized protection of forest lands against fire; conducts investigations in the entire field of forestry, including economic and industrial as well as forest research; diffuses information relating to the best use of forests and forest products; promulgates rules and regulations for the administration of grazing on national-forest ranges under general authority governing the occupancy and use of the forests; and, in short, seeks to promote the application of forestry throughout the country on both public and privately owned lands, together with efficient and economical use of their yields. The national forests comprise approximately 157 million acres of Government-owned land and contain approximately one-fifth of the timber in the United States, besides furnishing forage and recreation resources of great public value. Their administration aims to coordinate and develop to the utmost their use in the best public interest, through application of the technical methods of forestry as a subdivision of the art of agriculture. Sustained and, where possible, increased yields of water, timber, and livestock products are secured, together with provision for many other forms of use, under carefully devised management plans and systematic protection of the forests against fire and other destructive agencies. The management plans employ the scientific regulation of timber cutting and livestock grazing as means for securing reforestation and range conservation, along with full use of the annual growth obtained through such regulation.

BUREAU OF CHEMISTRY AND SOILS

This bureau was created on July 1, 1927, to take over the research work in chemistry and soils formerly conducted separately in the Bureau of Chemistry and the Bureau of Soils. The work of the bureau is organized under three units.

(1) The chemical and technological research unit applies the science of chemistry to the improvement of agriculture, develops processes for the utilization of agricultural products, and makes biological investigations of foods, including studies of their physiological effects on the human organism. It conducts experiments on the utilization, for coloring, medicinal, and technical purposes, of raw materials grown or produced in the United States; develops improved processes for grading, weighing, handling, transporting, and utilizing rosin and turpentine; conducts investigations for the development of methods of manufacturing insecticides and fungicides and studies chemical problems relating to the composition, action, and application of such materials; improves methods for dehydrating materials used for foods; and develops means to prevent farm fires and dust explosions and resulting fires, including fires in cotton gins and cotton-oil mills.

(2) The soil investigations unit studies, maps, and classifies the soils of the United States, and determines their suitability for agriculture. It investigates types of soil in relation to climate and natural vegetation and studies their chemical and physical properties and their productivity and response to fertilizers and soil amendments; conducts research in soil microbiology; and investigates the problem of soil erosion, with a view to determining the principles which should guide in the control and prevention of soil erosion.

(3) The fertilizer and fixed-nitrogen investigations unit studies the fertilizer resources of the United States. It studies the compatibility and mixing of fertilizer materials, methods of preparing such materials, and their suitability for agricultural use; investigates the economic utilization of the Nation's deposits of natural phosphate rock and the utilization of greensands as a source of potash; investigates the fixation of atmospheric nitrogen in relation to agriculture and national defense; gathers information regarding the development of nitrogen fixation in foreign countries, and codifies and makes available this information; and conducts research with a view to developing new and more efficient methods for fixing atmospheric nitrogen.

BUREAU OF ENTOMOLOGY

The Bureau of Entomology conducts investigations in economic entomology, involving studies of the life history and habits of insects injurious and those beneficial to agriculture, horticulture, and arboriculture, with a view to developing practical methods for destroying those found to be injurious and promoting the increase and spread of those found to be beneficial. It studies bee culture and beekeeping practices and investigates the life history and control of insects affecting the health of man and domestic animals. It is also engaged in checking the spread of the gipsy moth, brown-tail moth, satin moth, Japanese beetle, Asiatic beetle, European corn borer, and other dangerous foreign insect pests that have gained entry into this country.

BUREAU OF BIOLOGICAL SURVEY

The Bureau of Biological Survey investigates the relations and environmental needs of the wild life of the country, and makes recommendations and demonstrations for its conservation, economic utilization, and reasonable control, with special reference to the needs of agriculture, horticulture, stock raising, forestry, and recreation.

Information is gathered for educational and scientific purposes and as a basis for the service and regulatory work of the bureau through studies of the natural history, distribution, and classification of wild birds and other animals, native plant relationships, and biological surveys of definite areas. Investigations are made of the food habits of birds and other forms of wild-animal life, with a view to the control of the harmful and the conservation of the useful species. The bureau also conducts investigations for the improvement of Alaskan reindeer herds and for the protection and propagation in captivity of fur-bearing animals, including rabbits for meat and fur, and gives advice and assistance to organizations and individuals engaged in these new industries.

Expert leadership is provided by the bureau in cooperative control operations against injurious rodents and predatory animals. It also maintains and administers 76 national bird refuges and game preserves in continental United States and in Porto Rico, Alaska, and Hawaii, and through representation on the Alaska Game Commission lends assistance in the protection of land fur animals and game on reservations and elsewhere in Alaska.

The Bureau of Biological Survey administers the migratory-bird treaty and Lacey Acts through active patrol of hunting areas by a warden service maintained in various parts of the United States and through educational methods, to assist in the conservation of migratory game, insectivorous, and other birds and to regulate interstate traffic in wild birds and game and importations of wild birds and mammals.

BUREAU OF PUBLIC ROADS

The Bureau of Public Roads handles the engineering work of the Department of Agriculture. This work is divided into two main branches—highway engineering and agricultural engineering.

(1) The highway engineering branch deals with all highway functions of the department contemplated by the regular appropriations, including the conduct of highway research, and also with the work of administering the Federal-aid and forest road appropriations.

(2) The agricultural engineering branch conducts investigations of farm irrigation and drainage, farm machinery, farm buildings, and other rural engineering problems.

BUREAU OF AGRICULTURAL ECONOMICS

The Bureau of Agricultural Economics conducts studies of the economics of production and marketing, agricultural cooperation, farm organization, farm financial relations, farm labor, agricultural history and geography, land economics, and the problems of rural life. The bureau acquires and disseminates information regarding the marketing and distribution of farm products, and collects, compiles, summarizes, interprets, and makes public statistical data relating to agricultural production. Studies are made of marketing methods, conditions, and costs and with regard to the standardization, transportation, handling, and storage of agricultural products.

Reports are issued by the bureau which contain information on the supply, commercial movement, disposition, and market prices of fruits and vegetables, livestock and meats, dairy and poultry products, and hay, feed, and seed. Information is obtained and published also with regard to the supply of and demand for certain agricultural products in foreign countries. A market inspection service on fruits and vegetables is maintained in most of the States and a grading service on dairy products and on meats at several of the principal markets of the country.

Regulatory work is performed in connection with the enforcement of the cotton futures act, cotton standards act, grain standards act, and standard container act, and the administration of the warehouse act. The Center Market in the city of Washington is also operated by this bureau.

BUREAU OF HOME ECONOMICS

The Bureau of Home Economics conducts scientific studies of problems connected with the home, including questions of food and nutrition, economics, textiles and clothing, and housing and equipment. It assists the homemaker in the solution of these problems by sending information through bulletins, articles for newspapers and magazines, and radio releases. The bureau employs no field agents, but through the home demonstration agents under the Extension Service and the State colleges it is in close contact with homemakers and professional home economics workers.

FEDERAL HORTICULTURAL BOARD

The Federal Horticultural Board is charged with the enforcement of the plant quarantine act, regulating the importation of plants and plant products, including nursery stock, fruits, vegetables, cotton, and other plants and plant products necessary to exclude new and dangerous plant pests, as well as the movement within the United States of any plant or plant products or other article necessary to prevent the spread of new plant pests which have more or less limited foothold. The board also administers a number of special quarantine and control appropriations, such as those for the pink bollworm of cotton and the date scale, and cooperates with the Bureaus of Entomology and Plant Industry in quarantine control work under similar appropriations made to those

bureaus covering such pests as the European corn borer, Japanese beetle, gipsy and brown tail moths, black stem-rust of wheat, and blister rust of white pine.

The Federal Horticultural Board also enforces the act providing for the Mexican border inspection and control service; the act providing for export certification of domestic fruits, vegetables, seeds, and nursery stock and other plants for propagation; the insect pest act of 1905, and, in cooperation with the Post Office Department, the terminal inspection act of 1915.

GRAIN FUTURES ADMINISTRATION

The Grain Futures Administration is charged with the carrying out of the provisions of the grain futures act of September 21, 1922, which brings under the supervision of the Federal Government all trading in grain futures at grain exchanges designated as contract markets by the Secretary of Agriculture. The work consists of compiling daily reports of transactions in grain futures from all markets, in checking the dissemination of false and misleading information which affects or tends to affect the prices of grain, and in making general observations of the entire grain marketing machinery, with a view to prevent abnormal fluctuation of prices and to create market conditions which will reflect supply and demand.

FOOD, DRUG, AND INSECTICIDE ADMINISTRATION

The Food, Drug, and Insecticide Administration, made a unit of the Department of Agriculture on July 1, 1927, by a consolidation of the regulatory activities of the former Bureau of Chemistry with those of the Insecticide and Fungicide Board, enforces the food and drugs act, tea inspection act, naval stores act, insecticide and fungicide act, import milk act, and caustic poison act. As a result of this consolidation, the Insecticide and Fungicide Board has been abolished.

This administration inspects and analyzes samples of the various products coming under its surveillance, both in the field stations and in the laboratories in Washington, to the end that it may detect and cause to be removed from the channels of trade all those that fail to comply with the terms of the acts which it enforces. It assists manufacturers to keep their products in compliance with these acts and institutes legal action against those who violate the law. Its primary function is to protect the consuming public against misbranded or adulterated foods, drugs, naval stores, insecticides, and fungicides, and honest manufacturers against enforced competition with such goods.

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T. R. Reed, *Assoc. Met., Asst. Forecr.*

Washington Dist. (States east of Mississippi River except Illinois, Indiana, Michigan, and Wisconsin).
C. L. Mitchell, *Sr. Met., Forecr.*
R. H. Weightman, LL. B., *Met., Forecr.*

CLIMATOLOGICAL SECTION HEADQUARTERS

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Alaska—Juneau:
R. C. Mize, *Assoc. Met.*
Arizona—Phoenix:
R. Q. Grant, *Assoc. Met.*
Arkansas—Little Rock:
H. S. Cole, B. S., *Assoc. Met.*
California—San Francisco:
E. H. Bowie, M. Sc., *Sr. Met.*
Colorado—Denver:
J. M. Sherier, *Sr. Met.*
Connecticut—See New England.
Delaware—See Maryland.
Florida—Jacksonville:
A. J. Mitchell, B. E., *Met.*
Georgia—Atlanta:
C. F. von Herrmann, *Met.*
Hawaii—Honolulu:
J. F. Voorhees, *Assoc. Met.*
Idaho—Boise:
C. E. Norquest, *Assoc. Met.*
Illinois—Springfield:
C. J. Root, *Assoc. Met.*
Indiana—Indianapolis:
J. H. Armington, *Met.*
Iowa—Des Moines:
C. D. Reed, M. Sc. Agr., *Met.*
Kansas—Topeka:
S. D. Flora, *Assoc. Met.*
Kentucky—Louisville:
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Maine—See New England.
Maryland and Delaware—Baltimore:
Roscoe Nunn, *Assoc. Met.*
Massachusetts—See New England.
Michigan—Lansing:
D. A. Seeley, M. S., *Assoc. Met.*
Minnesota—Minneapolis:
U. G. Purssell, *Assoc. Met.*
Mississippi—Vicksburg:
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Missouri—Columbia:
George Reeder, *Assoc. Met.*
Montana—Helena:
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Nebraska—Lincoln:
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New Jersey—Trenton:
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North Carolina—Raleigh:
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North Dakota—Bismarck:
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Ohio—Columbus:
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Oklahoma—Oklahoma City:
J. P. Slaughter, *Assoc. Met.*
Oregon—Portland:
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Washington—Seattle:
M. B. Summers, *Met.*
West Virginia—Parkersburg:
H. C. Howe, *Assoc. Met.*
Wisconsin—Milwaukee:
W. P. Stewart, *Assoc. Met.*
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Dallas S. Burch, B. S. A., *Ed.*
Harry Goding, LL. B., *Admin. Asst.*
R. S. Allen, *Asst. in Exhibits.*
E. C. Schroeder, M. D. V., *Sr. Vet., Supt. of Exp. Sta.* (*Bethesda, Md.*)

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California—Los Angeles:
G. T. Irons, D. V. S., *Assoc. Vet., Insp. in charge.*
Colorado—Denver:
W. E. Howe, D. V. M., *Assoc. Vet., Insp. in charge.*
Delaware—Wilmington:
T. J. Kean, D. V. M., M. D., *Assoc. Vet., Insp. in charge.*
District of Columbia—Washington:
H. K. Walter, V. M. D., *Assoc. Vet., Insp. in charge.*
Georgia—Atlanta:
A. L. Hirleman, D. V. M., *Assoc. Vet., Insp. in charge.*
Illinois:
Chicago—
H. Busman, M. D., V. S., *Vet. Insp. in charge.*
National Stock Yards—
C. F. Payne, V. S., *Vet., Insp. in charge.*

Public Stockyards Inspection—Continued.

Indiana—Indianapolis:
G. W. Butler, V. S., *Assoc. Vet., Insp. in charge.*
Iowa—Sioux City:
A. E. Behnke, D. V. S., *Assoc. Vet., Insp. in charge.*
Kansas:
Kansas City—.
James Fleming, M. D., V. S., *Vet. Insp. in charge.*
Wichita—
W. C. Herrold, V. S., *Assoc. Vet., Insp. in charge.*
Kentucky—Louisville:
J. B. Johnson, D. V. M., *Assoc. Vet., Insp. in charge.*
Louisiana—New Orleans:
G. T. Cole, V. M. D., *Assoc. Vet., Insp. in charge.*
Maryland—Baltimore:
H. A. Hedrick, D. V. S., *Assoc. Vet., Insp. in charge.*
Massachusetts—Boston:
E. A. Crossman, M. D. V., *Vet., Insp. in charge.*
Michigan—Detroit:
E. P. Schaffter, V. S., *Assoc. Vet., Insp. in charge.*
Minnesota—South St. Paul:
G. E. Totten, D. C. M., *Vet., Insp. in charge.*

Public Stockyards Inspection—Continued.
Missouri—South St. Joseph:
B. J. Stockler, D. V. M., *Assoc. Vet., Insp. in charge.*
Nebraska—Omaha:
J. S. Jenison, D. V. M., *Vet., Insp. in charge.*
New Jersey—Jersey City:
E. H. Baumann, M. D. V., *Assoc. Vet., Insp. in charge.*
New York:
Albany—
G. H. Woolfolk, D. V. S., *Assoc. Vet., Insp. in charge.*
Buffalo—
B. P. Wende, V. S., *Vet., Insp. in charge.*
New York—
D. R. Gilles, M. D., V. S., *Vet., Insp. in charge.*
Ohio:
Cincinnati—
Frank Jelen, D. V. S., *Assoc. Vet., Insp. in charge.*
Cleveland—
H. H. George, D. V. S., *Assoc. Vet., Insp. in charge.*
Dayton—
————, *Assoc. Vet., Insp. in charge.*
Oklahoma—Oklahoma City:
Jens Madsen, M. D., D. V. M., *Assoc. Vet., Insp. in charge.*
Oregon—Portland:
M. O. Anderson, V. S., *Assoc. Vet., Insp. in charge.*
Pennsylvania:
Lancaster—
H. S. Weber, M. D. V., *Asst. Vet., Insp. in charge.*
Philadelphia—
Thomas Castor, V. M. D., *Assoc. Vet., Insp. in charge.*
Pittsburgh—
C. J. Millen, D. V. M., *Assoc. Vet., Insp. in charge.*
South Dakota—Sioux Falls:
C. J. Young, D. V. S., *Assoc. Vet., Insp. in charge.*
Tennessee:
Chattanooga—
F. H. Collins, V. M. D., *Asst. Vet., Insp. in charge.*
Memphis—
C. L. E. Kerr, D. V. M., *Asst. Vet., Insp. in charge.*
Nashville—
E. F. Cary, D. V. S., *Assoc. Vet., Insp. in charge.*
Texas:
Fort Worth—
H. L. Darby, D. V. S., *Vet., Insp. in charge.*
Houston—
C. F. Palmer, D. V. S., *Assoc. Vet., Insp. in charge.*

Public Stockyards Inspection—Continued.
Texas—Continued.
San Antonio—
Wm. Thompson, M. D. C., *Assoc. Vet., Insp. in charge.*
Vermont—Canaan:
J. W. Harner, D. V. M., *Asst. Vet., Insp. in charge.*
Virginia—Richmond:
Henry Marshall, D. V. M., *Assoc. Vet., Insp. in charge.*
Washington—Spokane:
Edward D. Kennedy, D. V. S., *Assoc. Vet., Insp. in charge.*
West Virginia—Wheeling:
R. F. Vermilya, D. M. C., *Assoc. Vet., Insp. in charge.*
Wisconsin—Milwaukee:
E. S. Dickey, Ph. C., D. V. S., *Assoc. Vet., Insp. in charge.*

International Inspection and Quarantine.
California:
Calexico—
J. C. Pace, D. V. S., *Jr. Vet., Insp. in charge.*
San Diego—
J. E. Cloud, D. V. S., *Asst. Vet., Insp. in charge.*
San Francisco—
H. H. Hicks, M. D. V., *Assoc. Vet., Insp. in charge.*
England—London:
R. W. Tuck, D. V. S., *Vet., Insp. in charge.*
Louisiana—New Orleans:
G. T. Cole, V. M. D., *Assoc. Vet., Insp. in charge.*
Maine:
Calais—
R. D. Hyde, D. V. M., *Asst. Vet., Insp. in charge.*
Houlton:
I. H. Kaufman, D. V. M., *Asst. Vet., Insp. in charge.*
Maryland—Baltimore:
H. A. Hedrick, D. V. S., *Assoc. Vet., Insp. in charge.*
Massachusetts—Boston:
A. E. Staub, D. V. M., D. V. S., *Vet., Insp. in charge.*
Mexico—Mexico City:
S. O. Fladness, D. V. M., *Vet., Insp. in charge.*
Michigan:
Detroit—
E. P. Schaffter, V. S., *Assoc. Vet., Insp. in charge.*
Port Huron—
C. H. Canfield, D. V. M., *Asst. Vet., Insp. in charge.*
Montana—Helena:
J. W. Murdoch, D. V. S., *Assoc. Vet., Insp. in charge.*
New Jersey—Athenia:
A. E. Rishel, D. V. S., *Assoc. Vet., Insp. in charge.*

International Inspection and Quarantine—Continued.

New York:

Albany—

G. H. Woolfolk, D. V. S., *Assoc Vet., Insp. in charge.*

Buffalo—

B. P. Wende, D. V. S., *Vet., Insp. in charge.*

New York—

A. E. Rishel, D. V. S., *Assoc. Vet., Acting Insp. in charge.*

Ogdensburg—

C. O. Benson, D. V. S., *Asst. Vet., Insp. in charge.*

Rouses Point—

D. G. Shumway, V. M. D., *Asst. Vet., Insp. in charge.*

Watertown—

F. J. Loomis, D. V. M., *Vet. Insp., Insp. in charge.*

North Dakota—Bismarck:

H. H. Cohenour, M. D. V., *Assoc Vet., Insp. in charge.*

Oregon—Portland:

M. O. Anderson, V. S., *Assoc. Vet., Insp. in charge.*

Pennsylvania—Philadelphia:

Thomas Castor, V. M. D., *Assoc. Vet., Insp. in charge.*

Porto Rico—Rio Piedras:

Juan Veras Catala, V. S., *Vet. Insp., Insp. in charge.*

Texas:

El Paso—

T. A. Bray, D. V. S., *Asst. Vet., Insp. in charge.*

Houston—

C. F. Palmer, D. V. S., *Assoc. Vet., Insp. in charge.*

San Antonio—

Wm. Thompson, M. D. C., *Assoc. Vet., Insp. in charge.*

Vermont—Newport:

J. E. Spindler, V. M. D., *Asst. Vet., Insp. in charge.*

Washington:

Seattle—

C. L. Norris, D. V. S., *Assoc. Vet., Insp. in charge.*

Spokane—

E. D. Kennedy, D. V. S., *Assoc. Vet., Insp. in charge.*

Scabies and Dourine Eradication.

California—Sacramento:

R. Snyder, M. D. C., *Assoc. Vet., Insp. in charge.*

Colorado—Denver:

W. E. Howe, D. V. M., *Assoc. Vet., Insp. in charge.*

Kansas—Topeka:

N. L. Townsend, V. M. D., *Assoc. Vet., Insp. in charge.*

Kentucky—Frankfort:

W. F. Biles, D. V. M., *Assoc. Vet., Insp. in charge.*

Scabies and Dourine Eradication—Contd.

Louisiana—Baton Rouge:

C. J. Becker, D. V. M., *Assoc. Vet., Insp. in charge.*

Montana—Helena:

J. W. Murdoch, D. V. S., *Assoc. Vet., Insp. in charge.*

Nebraska—Lincoln:

A. H. Francis, D. V. M., *Assoc. Vet., Insp. in charge.*

New Mexico—Albuquerque:

F. L. Schneider, B. S., D. V. S., *Vet., Insp. in charge.*

North Dakota—Bismarck:

H. H. Cohenour, M. D. V., *Assoc. Vet., Insp. in charge.*

Oklahoma—Oklahoma City:

L. J. Allen, D. V. S., *Vet., Insp. in charge.*

South Dakota—Pierre:

J. O. Wilson, D. V. M., *Assoc. Vet., Insp. in charge.*

Texas—Fort Worth:

H. L. Darby, D. V. S., *Vet., Insp. in charge.*

Utah—Salt Lake City:

F. E. Murray, D. V. M., *Assoc. Vet., Insp. in charge.*

Washington—Olympia:

J. C. Exline, D. V. M., *Assoc. Vet., Insp. in charge.*

Wyoming—Cheyenne:

J. T. Dallas, B. S. A., D. V. M., *Assoc. Vet., Insp. in charge.*

TUBERCULOSIS ERADICATION DIVISION

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A. E. Wight, M. D. V., *Vet., Asst. Chief.*

L. B. Ernest, D. V. M., *Assoc. Vet.*

Elmer Lash, D. V. S., *Assoc. Vet.*

FIELD STATIONS (work conducted in coop. with States):

Alabama—Birmingham—

R. E. Jackson, D. V. M., *Assoc. Vet.*

Arkansas—Little Rock—

H. L. Fry, D. V. M., *Asst. Vet.*

California—Sacramento—

Rudolph Snyder, M. D. C., *Assoc. Vet.*

Colorado—Denver—

W. E. Howe, D. V. S., *Assoc. Vet.*

Connecticut—Hartford—

R. L. Smith, D. V. S., *Assoc. Vet.*

Florida—Tallahassee—

J. G. Fish, D. V. S., *Asst. Vet.*

Georgia—Atlanta—

A. L. Hirleman, D. V. M., *Assoc. Vet.*

Idaho—Boise—

W. A. Sullivan, D. V. M., *Assoc. Vet.*

Illinois—Chicago—

J. J. Lintner, M. D. C., *Vet.*

Indiana—Indianapolis—

J. E. Gibson, V. S., *Assoc. Vet.*

Iowa—Des Moines—

J. A. Barger, D. V. S., *Vet.*

FIELD STATIONS—Continued.
Kansas—Topeka—
N. L. Townsend, V. M. D., *Assoc. Vet.*
Kentucky—Frankfort—
W. F. Biles, D. V. M., *Assoc. Vet.*
Louisiana—New Orleans—
G. T. Cole, V. M. D., *Assoc. Vet.*
Maine—Augusta—
G. R. Caldwell, V. S., *Assoc. Vet.*
Maryland—Baltimore—
E. B. Simonds, D. V. M., *Assoc. Vet.*
Massachusetts—Boston—
E. A. Crossman, D. V. M., *Vet.*
Michigan—Lansing—
T. S. Rich, D. V. M., *Vet.*
Minnesota—St. Paul—
W. J. Fretz, D. V. S., *Vet.*
Mississippi—Jackson—
Hartwell Robbins, D. V. S., *Assoc. Vet.*
Missouri—Jefferson City—
Ralph Graham, D. V. M., *Vet. Insp. (Coop.).*
Montana—Helena—
J. W. Murdoch, D. V. S., *Assoc. Vet.*
Nebraska—Lincoln—
A. H. Francis, D. V. M., *Assoc. Vet.*
New Jersey—Trenton—
W. G. Middleton, D. V. M., *Assoc. Vet.*
New Mexico—Albuquerque—
F. L. Schneider, B. S., D. V. S., *Vet.*
New York—Albany—
H. B. Leonard, D. V. M., *Vet. (Coop.).*
North Carolina—Raleigh—
W. C. Dendinger, D. V. M., *Assoc. Vet.*
North Dakota—Bismarck—
H. H. Cohenour, D. V. M., *Assoc. Vet.*
Ohio—Columbus—
A. J. DeFosset, D. V. M., *Assoc. Vet.*
Oklahoma—Oklahoma City—
L. J. Allen, V. S., *Vet.*
Oregon—Portland—
S. B. Foster, D. V. S., *Assoc. Vet.*
Pennsylvania—Harrisburg—
J. B. Reidy, D. V. M., *Assoc. Vet.*
South Carolina—Columbia—
W. K. Lewis, D. V. S., *Vet. (Coop.).*
South Dakota—Pierre—
J. O. Wilson, D. V. M., *Assoc. Vet.*
Tennessee—Nashville—
H. M. O'Rear, D. V. M., *Assoc. Vet.*
Texas—Fort Worth—
H. L. Darby, D. V. S., *Vet.*
Utah—Salt Lake City—
F. E. Murray, D. V. M., *Assoc. Vet.*
Vermont—Montpelier—
L. H. Adams, V. M. D., *Assoc. Vet.*
Virginia—Richmond—
R. E. Brookbank, D. V. S., *Assoc. Vet.*
Washington—Olympia—
J. C. Exline, D. V. M., *Assoc. Vet.*
West Virginia—Charleston—
H. M. Newton, D. V. M., *Assoc. Vet. (Coop.).*
Wisconsin—Madison—
James S. Healy, M. D. V., *Vet.*

FIELD STATIONS—Continued.
Wyoming—Cheyenne—
J. T. Dallas, B. S. A., D. V. M., *Asst. Vet.*

TICK ERADICATION DIVISION

R. A. Ramsay, D. V. S., B. S. A., *Sr. Vet., Chief.*
W. M. MacKellar, V. S., *Vet., Asst. Chief.*

FIELD STATIONS (work conducted in coop. with States):
Alabama—Birmingham—
R. E. Jackson, V. S., *Assoc. Vet., Insp. in charge.*
Arkansas—Little Rock—
W. A. McDonald, D. V. M., *Assoc. Vet., Insp. in charge.*
Florida—Jacksonville—
S. J. Horne, D. V. M., *Assoc. Vet., Insp. in charge.*
Louisiana—Baton Rouge—
C. J. Becker, D. V. M., *Assoc. Vet., Insp. in charge.*
Mississippi—Jackson—
Hartwell Robbins, D. V. S., *Assoc. Vet., Insp. in charge.*
Oklahoma—Oklahoma City—
L. J. Allen, V. S., *Vet., Insp. in charge.*
South Carolina—Columbia—
W. K. Lewis, M. D. V., *Vet. (Coop.), in charge.*
Texas—Fort Worth—
H. L. Darby, D. V. S., *Vet., Insp. in charge.*
Virginia—Suffolk—
Seaborn H. Still, D. V. S., *Asst. Vet., Acting Insp. in charge.*

ANIMAL HUSBANDRY DIVISION

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William Jackson, B. S. A., *Asst. An. Husb.*

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A. T. Semple, B. S., *Assoc. An. Husb.*
E. W. McComas, B. S., *Asst. An. Husb.*

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E. Z. Russell, *An. Husb., in charge.*
S. S. Buckley, D. V. S., M. S., *Assoc. An. Husb.*
O. G. Hankins, B. S., *Assoc. An. Husb.*
J. H. Zeller, B. S., *Asst. An. Husb.*

Sheep.
D. A. Spencer, B. S., *An. Husb., in charge.*
J. I. Hardy, M. S., Ph. D., *An. Husb.*
C. G. Potts, B. S., *Assoc. An. Husb.*
Mary J. Brandon, A. B., *Jr. An. Husb.*
J. B. Tennyson, *Jr. Sci. Aid.*

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J. O. Williams, B. S. A., *An. Husb., in charge.*
S. R. Speelman, B. S. A., *Asst. An. Husb.*

Poultry.

M. A. Jull, B. S. A., M. Sc., Ph. D., *Poultry Husb., in charge.*
A. R. Lee, B. S., *Assoc. Poultry Husb.*
J. P. Quinn, *Chief Sci. Aid.*
S. Haynes, *Chief Sci. Asst.*

Animal Genetics.

H. C. McPhee, Sc. D., *An. Husb., in charge.*
O. N. Eaton, M. S., *Asst. An. Husb.*
Bradford Knapp, Jr., M. S., *Agt. in An. Husb.*

Nutrition.

Paul E. Howe, M. A., Ph. D., *Biol. Chem., in charge.*
N. R. Ellis, B. S., M. S., *Assoc. Chem. (soft pork).*
H. W. Titus, B. A., M. A., *Assoc. Biol. Chem. (poultry).*
H. G. Barott, E. E., *Assoc. Phys. (poultry).*
W. B. Emerson, M. E., *Assoc. Biophys. (poultry).*
S. J. Dahl, M. S., *Jr. Chem. (soft pork).*
P. C. Hilberg, B. S., *Jr. Chem. (meat inv.).*
W. A. Hendricks, *Asst. Sci. Aid (meat inv.).*
John W. Knowlton, *Jr. Sci. Aid (meat inv.).*
Emma A. Pringle*, *Asst. Sci. Aid (poultry).*
W. R. Kauffman, *Under Sci. Helper (poultry).*
E. McNally, *Under Sci. Helper (poultry).*
Barbara F. Glessing, A. B., *Sr. Translator (meat inv.).*

Meat.

K. F. Warner, A. B., M. S., *Assoc. An. Husb., in charge.*
H. N. Baker, B. S., *Asst. An. Husb.*
J. E. Dick, B. S., *Sci. Aid.*

Extension.

C. D. Lowe, D. V. M., *Ext. An. Husb.* (In coop. with Off. of Coop. Ext. Work).
H. L. Shrader, B. S., *Ext. Poultry Husb.* (In coop. with Off. of Coop. Ext. Work).

Animal Husbandry Experiment Farm, Beltsville, Md. (beef cattle, swine, sheep, poultry, and horse inv.).

B. F. Brandon, B. S. A., *Assoc. An. Husb., in charge.*
C. S. Kelleher, *Chief Engr. Aid.*
T. D. John, *Sci. Aid.*

Field Stations.

Arizona—
Glendale (Poultry Exp. Sta.)—
B. Heywang, B. S. A., *Assoc. Poultry Husb., in charge.*
Tempe (sheep and goat inv., in coop. with Ariz. Exp. Sta., N. Mex. Exp. Sta., and Bur. of Agr. Econ.)—
K. K. Henness, B. S., M. S., *in charge.*

Field Stations—Continued.

Arkansas—Jonesboro (beef cattle inv., in coop. with Ark. Exp. Sta. and First Dist. Agr. School)—
H. W. Hollard, B. S., M. S., *Agt. in An. Husb. (Coop.), in charge.*

Connecticut—Storrs (horse inv., in coop. with Storrs Exp. Sta., Bur. of Public Roads, and Bur. Agr. Econ.)—
R. E. Shimm, *Agt. in An. Husb. (Coop.), in charge.*

Idaho—Dubois (U. S. Sheep Exp. Sta.)—
W. A. Dönecke, B. S., *Assoc. An. Husb., in charge.*
J. M. Cooper, B. S., *Asst. An. Husb.*

Louisiana—Jeanerette (Iberia Livestock Exp. Farm; beef cattle, swine, and mule inv., in coop. with La. Exp. Sta.)—
W. T. Cobb, *Agt. in An. Husb., Acting in charge.*

Mississippi—McNeill (Coastal Plains Exp. Sta.; beef cattle, swine, and sheep inv., in coop. with Miss. Exp. Sta.)—
S. W. Greene, B. S. A., M. S., *Assoc. An. Husb. (Coop.), in charge.*

Missouri—
Columbia (swine inv., in coop. with Mo. Exp. Sta.)—
————, *Agt. in An. Husb. (Coop.), in charge.*
Grain Valley (beef cattle inv., in coop. with Mo. Exp. Sta.)—
C. S. Maddox, B. S., *Jr., An. Husb. (Coop.), in charge.*

Montana—
Havre (beef cattle inv., in coop. with Mont. Exp. Sta.)—
George W. Morgan, B. S. (Bur. of Pl. Ind.), *in charge.*
Huntley (swine inv., in coop. with Mont. Exp. Sta.)—
Dan Hansen (Bur. of Pl. Ind.), *in charge.*
Miles City (beef cattle, sheep, swine, horse, and poultry inv., in coop. with Mont. Exp. Sta.)—
J. R. Quesenberry, B. S. A. M. S., *An. Husb., in charge.*
A. L. Baker, B. S., *Asst. An. Husb.*
E. B. Krantz, B. S. A., M. S., *Asst. An. Husb.*
R. E. Hutton, B. S. A., *Jr. An. Husb.*

South Dakota—
Ardmore (beef cattle and swine inv.)—
Q. R. Mathews, M. S. (Bur. of Pl. Ind.), *in charge.*

Field Stations—Continued.
South Dakota—Continued.
Newell (Belle Fourche Exp. Farm; swine and sheep inv.)—
Beyer Aune, B. Agr., *Assoc. Agron.* (Bur. of Pl. Ind.), *in charge.*
Spearfish (beef cattle inv., in coop. with Exp. Stations in Northern Great Plains area)—
M. B. Johnson, *Agt. in An. Husb., in charge.*
Texas—
Sonora (beef cattle inv., in coop. with Texas Exp. Sta. and Bur. of Agr. Econ.)—
J. N. Tate, *Collaborator (Bur. of Agr. Econ.), in charge.*
Stamford (beef cattle inv., in coop. with Western Range States)—
V. V. Parr, B. S., *Assoc. An. Husb., in charge.*
Vermont—Middlebury (Morgan Horse Farm; horse, sheep, and beef cattle inv.)—
J. A. Stoehr, B. S., *Jr. An. Husb., Acting in charge.*
West Virginia—Lewisburg (beef cattle inv., in coop. with W. Va. Exp. Sta.)
R. H. Tuckwiller, B. S., *Agt. in An. Husb., in charge.*

BIOCHEMIC DIVISION

M. Dorset, B. S., M. D., D. V. M., *Sr. Biochem., Chief.*
James A. Emery, M. D., *Biochem., Asst. Chief.*

Hog-Cholera Investigations.
Chief of Div. in charge.
F. W. Tilley, A. B., M. D., *Assoc. Bact.*
R. R. Henley, M. S., *Assoc. Biochem.*
Henry E. Moskey, V. M. D., *Asst. Vet.*

Field Headquarters:
Iowa—Ames—
W. B. Niles, D. V. M., *Assoc. Vet., in charge.*
C. N. McBryde, M. S., M. D., Ph. D., *Assoc. Bact.*

Biochemical Investigations of Meats.
Ralph Hoagland, B. Agr., *Biochem., in charge.*
Wilmer C. Powick, B. A., *Assoc. Biochem.*
George G. Snider, A. B., *Sr. Sci. Aid.*
Harry Goldsmith, *Minor Sci. Helper.*

Dip and Disinfectant Investigations.
Robt. M. Chapin, B. A., *Biochem., in charge.*
Jacob M. Schaffer, M. S., *Assoc. Chem.*

Tuberculin and Mallein Production.
Asst. Chief of Div. in charge.
Albert M. West, B. S., *Asst. Bact.*
Percy W. LeDuc, A. B., *Jr. Chem.*
Angus D. MacDonald, D. V. M., *Jr. Vet.*

PATHOLOGICAL DIVISION

John S. Buckley, D. V. S., *Sr. Path., Chief.*
Henry J. Washburn, D. V. S., *Bact., Asst. Chief.*

General Pathology.
Robt. J. Formad, V. M. D., M. D., *Assoc. Path.*
Gilbert T. Creech, D. V. S., *Assoc. Vet.*
Branch Pathological Laboratories:
Colorado—Denver—
George W. Stiles, M. D., Ph. D., *Assoc. Bact., in charge.*
Maude E. Starcher, *Lab. Aid in Bact.*
Illinois—Chicago—
L. Enos Day, V. S., *Assoc. Vet., in charge.*
John S. Bengston, *Asst. Vet.*
Maryland—Bethesda—
Walter J. Hall, V. M. D., *Jr. Vet.*
Nebraska—Omaha—
G. Byron Morse, M. D., Ph. D., V. S., *Assoc. Bact., in charge.*

Diseases of Animals.
Henry J. Washburn, D. V. S., *Bact. (tuberculosis inv.).*
John M. Buck, D. V. M., *Assoc. Bact. (abortion inv.)*
Warren B. Shook, V. M. D., *Asst. Vet. (tuberculosis inv.).*
Hubert Bunyea, D. V. S., A. B., *Assoc. Vet. (poultry disease inv.).*
L. T. Giltner, V. M. D., M. S., *Assoc. Vet. (misc. diseases).*
William M. Mohler, D. V. M., *Asst. Vet. (misc. infectious diseases).*
Harry W. Schoening, V. M. D., *Assoc. Vet. (rabies inv.).*

Stock Poisoning by Plants.
C. Dwight Marsh, Ph. D., *Assoc. Physiol.*
Arthur B. Clawson, B. A., *Assoc. Physiol.*
Jas. F. Couch, A. M., *Assoc. Chem.*
Herbert Rogers, *Minor Sci. Helper.*

Serums, Viruses, Toxins.
William S. Gochenour, V. M. D., *Assoc. Vet. (bact. inv.).*
Harry W. Schoening, V. M. D., *Assoc. Vet. (serological inv.).*
William M. Mohler, D. V. M., *Asst. Vet. (serological inv.).*

DIVISION OF VIRUS-SERUM CONTROL

D. I. Skidmore, V. S., *Sr. Vet., Chief.*
R. E. Holm, D. V. M., *Vet., Asst. Chief.*
Field Stations and Substations:
California—Stockton—
W. J. Stewart, M. D., D. V. M., *Assoc. Vet., Insp. in charge.*
Colorado—Denver—
E. H. Carter, V. S., *Asst. Vet., Insp. in charge.*
Georgia—Albany—
C. A. Klein, D. V. M., *Asst. Vet., Insp. in charge.*

FIELD STATIONS AND SUBSTATIONS—Contd.
Illinois—
Aurora (substa. of East St. Louis)—
W. D. Livermore, D. V. M., *Asst. Vet., Insp.*
East St. Louis—
J. W. Joss, D. V. M., *Assoc. Vet., Insp. in charge.*
Whitehall (substa. of East St. Louis)—
W. T. Bollmeier, D. V. M., *Jr. Vet., Insp.*
Indiana—Indianapolis—
J. D. Stillwell, D. V. M., *Assoc. Vet., Insp. in charge.*
Noblesville (substa. of Indianapolis)—
O. C. Mayer, M. D. V., *Asst. Vet., Insp.*
Thorntown (substa. of Indianapolis)—
G. D. Ashley, D. V. M., *Asst. Vet., Insp.*
Zionsville (substa. of Indianapolis)—
Robert Thumann, D. V. M., *Asst. Vet., Insp.*
Iowa—
Des Moines (substa. of Fort Dodge)—
B. McCormack, D. V. M., *Asst. Vet., Insp.*
Fort Dodge—
D. G. Tepfer, D. V. M., *Asst. Vet., Insp. in charge.*
Muscatine (substa. of Ottumwa)—
C. P. Luneen, D. V. M., *Asst. Vet., Insp.*
Ottumwa—
E. E. Lollar, D. V. M., *Asst. Vet., Insp. in charge.*
Sioux City—
L. B. Vermillion, D. V. M., *Assoc. Vet., Insp. in charge.*
Kansas:
Hutchinson (substa. of Wichita)—
G. C. Gulick, D. V. M., *Asst. Vet., Insp.*
Kansas City—
F. A. Imler, D. V. M., *Vet., Insp. in charge.*
O. E. Herl, D. V. M., *Asst. Vet., Asst. to Insp. in charge.*
Lathrop (substa. of Kansas City, Kans.)—
J. C. Bolton, D. V. M., *Asst. Vet., Insp.*
Manhattan (substa. of Topeka, Kans.)—
H. J. Boyce, D. V. M., *Asst. Vet., Inspr.*
Topeka—
C. B. Clement, D. V. S., *Asst. Vet., Insp. in charge.*
Wichita—
F. N. Elwell, D. V. M., *Assoc. Vet., Insp. in charge.*
Minnesota—St. Paul:
C. V. Metcalf, D. V. M., *Asst. Vet., Insp. in charge.*

FIELD STATIONS AND SUBSTATIONS—Contd.
Missouri:
St. Joseph—
J. S. Clark, D. V. M., *Insp. in charge.*
South St. Joseph (substa. of St. Joseph)—
L. S. Rohrer, D. V. S., *Asst. Vet., Insp.*
West Plains—
J. F. Park, D. V. M., *Asst. Vet., Insp. in charge.*
Nebraska:
Franklin (substa. of Kansas City, Kans.)—
A. L. Faunce, M. D. C., *Asst. Vet., Insp.*
Grand Island (substa. of Omaha)—
C. D. Stein, D. V. M., *Asst. Vet., Insp.*
Hooper (substa. of Omaha)—
J. H. Cock, D. V. S., *Asst. Vet., Insp.*
Omaha—
H. H. Day, D. V. M., *Assoc. Vet., Insp. in charge.*
Ralston (substa. of Omaha)—
W. C. Hamilton, jr., D. V. M., *Asst. Vet., Insp.*
Superior (substa. of Kansas City, Kans.)—
Walter Boyce, D. V. M., *Asst. Vet., Insp.*
New York—Pearl River:
J. P. O'Leary, M. D. V., *Assoc. Vet., Insp. in charge.*
Ohio:
Columbus (substa. of Indianapolis, Ind.)—
R. N. Birdwhistell, D. V. M., *Asst. Vet., Insp.*
Fostoria (substa. of Indianapolis, Ind.)—
H. C. Berger, D. V. M., *Asst. Vet., Insp.*
Oklahoma—Oklahoma City (substa. of Wichita, Kans.):
C. L. Lash, D. V. S., *Asst. Vet., Insp.*
South Dakota—Sioux Falls (substa. of Sioux City, Iowa):
F. D. Houston, D. V. M., *Asst. Vet., Insp.*
Texas—Fort Worth:
E. T. Marsh, D. V. M., *Asst. Vet., Insp. in charge.*

ZOOLOGICAL DIVISION

Maurice C. Hall, B. S., A. M., Ph. D., D. Sc., D. V. M., *Sr. Zool., Chief.*

Parasites of Livestock.
Chief of Div. in charge.
Benjamin Schwartz, A. M., Ph. D., *Assoc. Zool.*

Parasites of Livestock—Continued.
Eloise B. Cram, M. S., Ph. D., *Assoc. Zool.*
Emmett W. Price, D. V. M., *Assoc. Parasit.*
Glenwood C. Roe, A. B., *Jr. Physiol.*
Myrna F. Jones, A. B., M. A., *Jr. Zool.*
FIELD STATIONS:
Georgia—Moultrie—
E. M. Nighbert, D. V. S., *Asst. Vet. (internal parasites of swine).*
Illinois—Chicago—
H. B. Raffensperger, D. V. M., *Asst. Vet. (internal parasites of swine).*
Kansas—Kansas City—
Marion Imes, D. V. M., M. S., *Vet. (external parasites).*
Louisiana—Jeanerette—
Gerald Dikmans, A. B., B. S. A., D. Sc., *Assoc. Parasit. (internal parasites of cattle).*
Mississippi—McNeill—
Cooper Curtice, D. V. M., M. D., *Assoc. Vet. (coop.) (internal parasites of sheep).*

Systematic Parasitology.
Albert Hassall, M. R. C. V. S., *Zool.*
Margie Potter, A. B., *Libr. Asst.*

MEAT INSPECTION DIVISION

R. P. Steddom, V. S., *Sr. Vet., Chief.*
A. J. Pistor, D. V. S., *Vet., Asst. Chief.*
E. C. Joss, B. S., D. C. M., *Vet., Asst. Chief.*
Wm. H. Smith, jr., V. M. D., *Vet., in charge of misc. work.*
F. W. Meyst, D. V. S., *Assoc. Vet., in charge of Label Section.*
Robert H. Kerr, B. S., *Chem., in charge of Meat Insp. Lab.*
FIELD STATIONS:
Alabama—
Birmingham—
W. H. Meadors, D. V. S., *Asst. Vet., Insp. in charge.*
Greenville—
A. W. Everett, *Prin. Lay Insp., in charge.*
Arizona—Phoenix—
A. J. Maloney, D. V. M., *Asst. Vet., Insp. in charge.*
Arkansas—
Fort Smith—
W. B. Nichols, *Prin. Lay Insp., in charge.*
Helena—
B. L. McCaslin, *Prin. Lay Insp., in charge.*
California—
Los Angeles—
G. T. Irons, D. V. S., *Assoc. Vet., Insp. in charge.*
San Diego—
Joel E. Cloud, V. S., *Asst. Vet., Insp. in charge.*
FIELD STATIONS—Continued.
California—Continued.
San Francisco—
H. H. Hicks, M. D. V., *Assoc. Vet., Insp. in charge.*
A. E. Graham, Ph. B., *Lab. Insp., in charge of Lab.*
Colorado—
Denver—
T. A. Shipley, D. V. S., *Assoc. Vet., Insp. in charge.*
Pueblo—
E. Himsel, D. V. M., *Asst. Vet., Insp. in charge.*
Connecticut—
Bridgeport—
Fred Hern, *Prin. Lay Insp., in charge.*
Hartford—
W. E. Jennings, *Prin. Lay Insp., in charge.*
New Haven—
S. A. Selby, D. V. S., *Asst. Vet., Insp. in charge.*
Delaware—Wilmington—
T. J. Kean, D. V. M., M. D., *Assoc. Vet., Insp. in charge.*
District of Columbia—Washington—
H. K. Walter, D. V. M., *Assoc. Vet., Insp. in charge.*
Florida—Jacksonville—
E. F. Haven, D. V. S., *Asst. Vet., Insp. in charge.*
Georgia—
Atlanta—
O. W. Seher, D. V. M., *Asst. Vet., Insp. in charge.*
Augusta—
J. E. Lovejoy, D. V. S., *Assoc. Vet., Insp. in charge.*
Moultrie—
J. R. Aufente, D. V. S., *Asst. Vet., Insp. in charge.*
Idaho—
Boise—
A. J. Creely, D. V. M., *Asst. Vet., Insp. in charge.*
Lewiston—
F. G. Miller, D. V. M., *Asst. Vet., Insp. in charge.*
Moscow
A. S. Martin, D. V. M., *Asst. Vet., Insp. in charge.*
Sandpoint—
E. G. Pigman, D. V. M., *Asst. Vet., Insp. in charge.*
Illinois—
Alton—
James Johnston, V. S., M. D., *Asst. Vet., Insp. in charge.*
Cairo—
G. C. Pleper, D. V. M., *Asst. Vet., Insp. in charge.*
Chicago.—
Herman Busman, V. S., M. D., *Vet., Insp. in charge.*

FIELD STATIONS—Continued.
Illinois—Continued.
Chicago—Continued.
C. T. N. Marsh, *Assoc. Chem., in charge of Lab.*
Jacksonville—
J. Robinson, D. V. M., *Asst. Vet., Insp. in charge.*
National Stock Yards—
C. F. Payne, V. S., *Vet., Insp. in charge.*
Peoria—
A. N. Hughes, M. D. V., *Asst. Vet., Insp. in charge.*
Indiana—
Anderson—
Charles Corson, D. V. M., *Asst. Vet., Insp. in charge.*
Evansville—
H. J. Hoyman, M. D. V., *Asst. Vet., Insp. in charge.*
Fort Wayne—
H. J. Boyer, D. V. M., *Asst. Vet., Insp. in charge.*
Frankfort—
Joshua Miller, V. S., *Asst. Vet., Insp. in charge.*
Indianapolis—
G. W. Butler, V. S., *Assoc. Vet., Insp. in charge.*
R. W. Culbert, M. D. V., *Vet., Traveling Vet. Insp.*
La Fayette—
C. H. Herrold, M. D. V., V. S., *Asst. Vet., Insp. in charge.*
Logansport—
C. H. Deisel, D. V. M., *Asst. Vet., Insp. in charge.*
Madison—
R. R. Newman, D. V. S., *Asst. Vet., Insp. in charge.*
Richmond—
C. O. Wagoner, V. S., *Asst. Vet., Insp. in charge.*
Terre Haute—
L. H. Allen, M. D. V., *Asst. Vet., Insp. in charge.*
Iowa—
Cedar Rapids—
A. M. Casper, M. D. C., *Assoc. Vet., Insp. in charge.*
Davenport—
Joseph Hannon, M. D. V., *Asst. Vet., Insp. in charge.*
Des Moines—
C. W. Deming, D. V. M., *Asst. Vet., Insp. in charge.*
Dubuque—
H. H. Dell, D. V. S., *Asst. Vet., Insp. in charge.*
Mason City—
C. L. Elliott, D. V. M., *Assoc. Vet., Insp. in charge.*
Ottumwa—
F. T. Sult, D. V. M., *Assoc. Vet., Insp. in charge.*

FIELD STATIONS—Continued.
Iowa—Continued.
Sioux City—
A. E. Behnke, D. V. M., *Assoc. Vet., Insp. in charge.*
Waterloo—
J. E. Shelton, D. V. S., *Assoc. Vet., Insp. in charge.*
Kansas—
Arkansas City—
F. E. Hayworth, V. M. D., *Asst. Vet., Insp. in charge.*
Kansas City—
James Fleming, V. S., M. D., *Vet., Insp. in charge.*
H. C. Kershner, *Assoc. Lab. Insp., in charge of Lab.*
Leavenworth—
C. F. Pinkham, D. V. S., *Asst. Vet., Insp. in charge.*
Pittsburg—
W. K. Howard, M. D. C., *Asst. Vet., Insp. in charge.*
Topeka—
F. S. Bingham, D. V. S., *Asst. Vet., Insp. in charge.*
Wichita—
W. C. Herrold, D. V. S., *Assoc. Vet., Insp. in charge.*
Kentucky—
Henderson—
R. H. Nutt, D. V. M., *Asst. Vet., Insp. in charge.*
Louisville—
J. B. Johnson, D. V. M., *Assoc. Vet., Insp. in charge.*
Louisiana—
New Orleans—
G. T. Cole, V. M. D., *Assoc. Vet., Insp. in charge.*
Shreveport—
Levi Bryant, *Prin. Lay Insp., in charge.*
Maine—
Auburn—
L. K. Green, V. M. D., *Asst. Vet., Insp. in charge.*
Houlton—
I. H. Kaufman, D. V. M., *Asst. Vet., Insp. in charge.*
Portland—
A. N. Smith, V. M. D., *Asst. Vet., Insp. in charge.*
Maryland—
Baltimore—
H. A. Hedrick, D. V. S., *Assoc. Vet., Insp. in charge.*
Cumberland—
J. C. Shafer, *Prin. Lay Insp., in charge.*
Frederick—
W. F. Osborn, D. V. S., *Asst. Vet., Insp. in charge.*
Massachusetts—
Boston—
A. F. Staub, D. V. M., *Vet., Insp. in charge.*

FIELD STATIONS—Continued.
Massachusetts—Continued.
Haverhill—
L. E. Merrill, *Prin. Lay Insp., in charge.*
Springfield—
H. E. Brown, M. D. V., *Assoc. Vet., Insp. in charge.*
Worcester—
M. T. Perry, M. D. V., *Assoc. Vet., Insp. in charge.*
Michigan—
Detroit—
E. P. Schaffter, V. S., *Assoc. Vet., Insp. in charge.*
Menominee—
L. E. Epple, V. S., *Asst. Vet., Insp. in charge.*
Minnesota—
Albert Lea—
O. A. Stingley, B. Sc., D. V. S., *Assoc. Vet., Insp. in charge.*
Austin—
E. W. Barthold, M. D. C., *Assoc. Vet., Insp. in charge.*
Duluth—
Chester Miller, V. S., *Asst. Vet., Insp. in charge.*
Fergus Falls—
M. L. Davenport, D. V. M., *Asst. Vet., Insp. in charge.*
South St. Paul—
G. E. Totten, D. C. M., *Vet., Insp. in charge.*
Winona—
L. A. Wilson, D. V. M., *Asst. Vet., Insp. in charge.*
Mississippi—
Natchez—
J. B. Harris, *Prin. Lay. Insp., in charge.*
Vicksburg—
J. A. O'Brien, *Prin. Lay. Insp., in charge.*
Missouri—
St. Louis—
T. B. Pote, D. V. S., *Assoc. Vet., Insp. in charge.*
C. H. Swanger, B. S., *Assoc. Chem., in charge of Lab.*
South St. Joseph—
B. J. Stockler, D. V. M., *Assoc. Vet., Insp. in charge.*
Montana—Butte—
Albert E. Evans, M. D. C., *Asst. Vet., Insp. in charge.*
Nebraska—
Nebraska City—
G. A. Kay, D. C. M., *Asst. Vet., Insp. in charge.*
Omaha—
J. S. Jenison, D. V. M., *Vet., Insp. in charge.*
E. A. Boyer, B. S., *Assoc. Chem. in charge of Lab.*
F. P. St. Clair, D. V. M., M. D., *Vet., Traveling Vet. Insp.*

FIELD STATIONS—Continued.
Nevada—Reno—
L. C. Butterfield, D. C. M., *Assoc. Vet., Insp. in charge.*
New Hampshire—
Keene—
T. W. Carnachan, M. R. C. V. S., *Asst. Vet., Insp. in charge.*
Manchester—
W. F. Quigley, *Prin. Lay Insp., in charge.*
New Jersey—
Jersey City—
E. H. Baumann, V. M. D., *Assoc. Vet., Insp. in charge.*
Newark—
A. McBride, M. D. C., *Assoc. Vet., Insp. in charge.*
Paterson—
J. Huelsen, D. V. S., *Assoc. Vet., Insp. in charge.*
New York—
Albany—
G. H. Woolfolk, D. V. S., *Assoc. Vet., Insp. in charge.*
Brooklyn—
Albert Long, M. D. V., *Assoc. Vet., Insp. in charge.*
Buffalo—
B. P. Wende, V. S., *Vet., Insp. in charge.*
New York—
D. R. Gillies, V. S., M. D., *Vet., Insp. in charge.*
W. F. Schroeder, B. S., *Assoc. Chem., in charge of Lab.*
Pearl River—
J. P. O'Leary, M. D. V., *Assoc. Vet., Insp. in charge.*
North Carolina—
Asheville—
Herbert Bryan, D. V. M., *Asst. Vet., Insp. in charge.*
Charlotte—
Jacob Vogel, *Prin. Lay Insp., in charge.*
Wilmington—
A. H. Carpenter, *Prin. Lay Insp., in charge.*
North Dakota—
Fargo—
J. T. Cullen, D. V. M., *Asst. Vet., Insp. in charge.*
Grand Forks—
J. H. Kitzhofer, D. V. S., *Asst. Vet., Insp. in charge.*
Ohio—
Athens—
P. J. Huffman, jr., D. V. S., *Asst. Vet., Insp. in charge.*
Cincinnati—
Frank Jelen, D. V. S., *Assoc. Vet., Insp. in charge.*
Cleveland—
H. H. George, D. V. S., *Assoc. Vet., Insp. in charge.*

FIELD STATIONS—Continued.
Ohio—Continued.
Columbus—
O. W. Everly, D. V. S., *Asst. Vet., Insp. in charge.*
Dayton—
W. O. Trone, D. V. M., *Assoc. Vet., Insp. in charge.*
Marion—
F. E. Theobald, D. V. M., *Asst. Vet., Insp. in charge.*
Sidney—
C. T. Snyder, D. V. M., *Asst. Vet., Insp. in charge.*
Toledo—
M. L. Crans, V. S., *Asst. Vet., Insp. in charge.*
Washington Court House—
Albert Wiltshire, *Prin. Lay Insp., in charge.*
Youngstown—
H. L. Bollinger, *Prin. Lay Insp., in charge.*
Zanesville—
W. O. McHugh, V. S., *Asst. Vet., Insp. in charge.*
Oklahoma—Oklahoma City—
Jens Madsen, M. D., D. V. M., *Assoc. Vet., Insp. in charge.*
Oregon—Portland—
M. O. Anderson, V. S., *Assoc. Vet., Insp. in charge.*
Pennsylvania—
Allentown—
G. W. Famous, V. M. D., *Asst. Vet., Insp. in charge.*
Erie—
E. P. Barnhart, D. V. M., *Asst. Vet., Insp. in charge.*
Hallstead—
S. M. Page, V. M. D., *Asst. Vet., Insp. in charge.*
Harrisburg—
W. C. Siegmund, D. V. S., *Asst. Vet., Insp. in charge.*
Philadelphia—
Thomas Castor, V. M. D., *Assoc. Vet., Insp. in charge.*
Pittsburgh—
C. J. Millen, D. V. M., *Assoc. Vet., Insp. in charge.*
Pittston—
J. R. Donnelly, V. S., M. D. V., *Asst. Vet., Insp. in charge.*
Pottsville—
G. E. Repp, M. D. C., *Asst. Vet., Insp. in charge.*
Rhode Island—Providence—
H. M. Smith, M. D. V., *Assoc. Vet., Insp. in charge.*
South Carolina—Greenville—
F. E. Jentoft, *Prin. Lay Insp., in charge.*
South Dakota—
Huron—
P. P. Taylor, D. V. M., *Asst. Vet., Insp. in charge.*

FIELD STATIONS—Continued.
South Dakota—Continued.
Sioux Falls—
C. J. Young, D. V. S., *Assoc. Vet., Insp. in charge.*
Watertown—
L. P. McArdle, D. V. M., *Asst. Vet., Insp. in charge.*
Tennessee—
Chattanooga—
F. H. Collins, V. M. D., *Asst. Vet., Insp. in charge.*
Knoxville—
S. A. King, D. V. S., *Asst. Vet., Insp. in charge.*
Memphis—
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William J. Sando, M. S., *Assoc. Agron.*
Western Wheat Investigations:
J. Allen Clark, M. S., *Agron.*
Karl S. Quisenberry, M. S., *Assoc. Agron.*
H. Millard Joslin, B. A., *Jr. Chem.*
John B. Hooker, LL. M., *Sci. Aid.*
Oat Investigations:
T. Ray Stanton, M. S., *Agron.*
Franklin A. Coffman, M. S., *Assoc. Agron.*
Barley Investigations:
Harry V. Harlan, M. S., D. Sc., *Sr. Agron.*
Merritt N. Pope, B. S., A. M., *Assoc. Agron.*
Mary L. Martini, B. S., *Asst. Bot.*
Lucille Reinbach, B. A., *Jr. Agr. Stat.*
Rice Investigations:
Charles E. Chambliss, M. S., *Assoc. Agron.*

Cereal Agronomy Investigations—Continued.
Corn Investigations:
Frederick D. Richey, B. S., *Agron.*
Curtis H. Kyle, B. S., *Agron.*
Harry S. Garrison, B. S., *Asst. Agron.*
Joseph M. Hammerly, *Sr. Sci. Aid.*
Grain Sorghum and Broomcorn Investigation:
John H. Martin, M. S., Ph. D., *Assoc. Agron.*
Seed Flax Investigations:
Arthur C. Dillman, M. S., *Assoc. Agron.*

Cereal Pathology Investigations.
Aaron G. Johnson, M. S., Ph. D., *Sr. Path.*
Sac and Imperfect Fungi Investigations:
Aaron G. Johnson, M. S., Ph. D., *Sr. Path.*
Cereal Rust Investigations:
Harry B. Humphrey, B. S., Ph. D., *Sr. Path.*
Barberry Eradication:
Lynn D. Hutton, M. S., *Assoc. Path.*
Cereal Smut Investigations:
————, *Path.*
Marion A. Griffiths, M. S., *Asst. Path.*
Cereal Bacteria Investigations:
————, *Assoc. Path.*

Cereal Physiology Investigations.
Annie M. Hurd-Karrer,* M. S., Ph. D., *Assoc. Physiol.*
FIELD STATIONS (Coop.):
California —
Berkeley—
Ruth F. Allen, M. A., Ph. D., *Assoc. Path. (cereal rust inv.).*
Fred N. Briggs, M. S., Ph. D., *Asst. Path. (cereal smut inv.).*
Biggs—
Jenkin W. Jones, M. S., *Assoc. Agron. and Supt. (rice inv.).*
Davis—
Victor H. Florell, M. S., *Assoc. Agron. (cereal prod. and improvement).*
Colorado—Fort Collins—
Ernest A. Lungren, M. S., *Asst. Path. (barberry crad.).*
Georgia—Athens—
Ross R. Childs, M. S., *Agt. (cereal prod. and improvement).*
Idaho—
Aberdeen—
Gustav A. Wiebe, M. S., *Asst. Agron. (cereal prod. and improvement).*
Moscow—
J. Milford Raeder, M. S., *Agt. (stripe rust inv.).*
Illinois—
Bloomington—
James R. Holbert, M. S., Ph. D., *Agron. (corn root-rot, stalk rot, and ear-rot inv.).*

Cereal Physiology Investigations—Continued.
FIELD STATIONS (Coop.)—Continued.
Illinois—Continued.
Urbana—
Gordon C. Curran, B. S., *Assoc. Path. (barberry crad.).*
Indiana—La Fayette—
George N. Hoffer, A. B., M. S., D. Sc., *Path. (corn root-rot, stalk-rot, and ear-rot inv.).*
Benjamin H. Duddleston, M. S., *Assoc. Agron. (corn root-rot, stalk-rot, and ear-rot inv.).*
John F. Trost, M. S., *Assoc. Path. (corn root-rot, stalk-rot, and ear-rot inv.).*
Glenn M. Smith, M. S., *Asst. Path. (corn root-rot, stalk-rot, and ear-rot inv.).*
Leroy E. Compton, M. S., *Asst. Path. (leaf rust inv.).*
Joseph C. Arthur, M. S., Sc. D., *Agt. (rust inv.).*
Herbert S. Jackson, A. B., *Agt. (rust and smut mycology).*
Wayne E. Leer, M. S., *Agt. (barberry crad.).*
Edwin B. Mains, A. B., Ph. D., *Agt. (leaf rust inv.).*
Iowa—Ames—
Merle T. Jenkins, M. S., *Assoc. Agron. (corn inv.).*
Arthur A. Bryan, M. S., *Asst. Agron. (corn inv.).*
Sherlock M. Dietz, M. S., Ph. D., *Assoc. Path. (oat crown rust inv.).*
Lysle D. Leach, B. S., *Agt. (oat crown-rust inv.).*
Lyman C. Burnett, M. S., *Agt. (oat breeding inv.).*
Percy W. Rohrbaugh, B. A., *Agt. (barberry crad.).*
Kansas—
Manhattan—
Arthur M. Brunson, M. S., Ph. D., *Assoc. Agron. (corn inv.).*
Hurley Fellows, M. S., Ph. D. *Assoc. Path. (wheat foot-rot inv.).*
Charles O. Johnston, M. S., *Asst. Path. (leaf rust inv.).*
Leo E. Melchers, M. S., *Agt. (cereal rust and smut inv.)*
John H. Parker, M. S., *Agt. (cereal breeding and improvement).*
Hays—
Arthur F. Swanson, M. S., *Asst. Agron (cereal prod. and improvement).*
Louisiana—
Baton Rouge—
Hugo F. Stoneberg, M. S., *Asst. Agron. (corn inv.).*
Crowley—
J. Mitchell Jenkins, B. S., *Assoc Agron. and Supt. (rice inv.).*

Cereal Physiology Investigations—Continued.
FIELD STATIONS (Coop.)—Continued.
Michigan—East Lansing—
Walter F. Reddy, LL. B., *Assoc. Path. (barberry crad.).*
Minnesota—St. Paul—
Olaf S. Aamodt, M. S., Ph. D., *Assoc. Path. (cereal breeding inv.).*
Moses N. Levine, M. S., Ph. D., *Assoc. Path. (stem rust inv.)*
Leonard W. Melander, M. S., *Assoc. Path. (barberry crad.).*
Edmund B. Lambert, M. S., Ph. D., *Asst. Path. (stem rust inv.).*
Jonas J. Christensen, M. S., Ph. D., *Agt. (stem rust inv.).*
Gilbert D. George, *Agt. (stem rust inv.).*
Helen Hart, M. A., *Agt. (stem rust inv.).*
Emil H. Ostrom, B. S., *Agt. (barberry crad.).*
Elvin C. Stakman, M. A., Ph. D., *Agt. (stem rust inv.).*
James M. Wallace, B. S., *Agt. (stem rust inv.).*
Edward M. Freeman, M. S., Ph. D., *Collab. (stem rust inv.).*
Herbert K. Hayes, M. S., Sc. D., *Collab. (cereal breeding inv.).*
Ralph U. Cotter, M. S., *Asst. Path. (stem rust inv.).*
Missouri—Columbia—
Lewis J. Stadler, B. S., A. M., Ph. D., *Agt. (cereal prod. and improvement).*
Montana—
Bozeman—
William L. Popham, B. S., *Agt. (barberry crad.).*
Moccasin—
Burton B. Bayles, M. S., *Asst. Agron. (cereal prod. and improvement).*
Nebraska—
Lincoln—
Albert F. Thiel, M. A., *Assoc. Path. (barberry crad.).*
North Platte—
George F. Sprague, M. S., *Jr. Agron. (cereal prod. and improvement).*
New York—Ithaca—
Lowell F. Randolph, Ph. D., *Assoc. Cytol. (cytology, histology, and morphology of corn).*
William T. Craig, *Agt. (cereal prod. and improvement).*
Ernest Dorsey, B. S., Ph. D., *Agt. (cytology of cereals).*
North Dakota—
Dickinson—
Ralph W. Smith, M. S., *Assoc. Agron. (cereal prod. and improvement).*

Cereal Physiology Investigations—Continued.
FIELD STATIONS (Coop.)—Continued.
North Dakota—Continued.
Fargo—
George C. Mayone, M. S., *Assoc. Path. (barberry crad.).*
Lytton W. Boyle, M. S., *Asst. Path. (flax diseases).*
Mandan—
John C. Brinsmade, jr., A. B., *Asst. Agron. (flax inv.).*
Elmer R. Ausemus, M. S., *Jr. Agron. (cereal prod. and improvement).*
Ohio—Columbus—
John W. Baringer, A. B., M. S., *Assoc. Path. (barberry crad.).*
Oklahoma—Woodward—
John B. Sieglinger, M. S., *Assoc. Agron. (grain sorghum and broomcorn inv.).*
Oregon—Moro—
David E. Stephens, B. S., *Agron. and Supt. (cereal prod. and improvement).*
James F. Martin, B. S., *Agt. (cereal prod. and improvement).*
South Dakota—Brookings—
Raymond O. Bulger, B. S., *Agt. (barberry crad.).*
Tennessee—Knoxville—
Ludwig S. Mayer, M. S., *Asst. Agron. (corn inv.).*
Virginia—Rosslyn (Arlington Exp. Farm)—
Harold H. McKinney, M. S., *Path. (virus diseases).*
Robert W. Leukel, M. S., *Assoc. Path. (cereal disease inv.).*
Emery R. Rauker, B. S., M. A., Ph. D., *Assoc. Phys. (cereal smut inv.).*
Victor F. Tapke, B. S., Ph. D., *Assoc. Path. (cereal smut inv.).*
John W. Taylor, M. S., *Assoc. Agron. (cereal production and improvement).*
Richard S. Talbott, *Jr. Sci. Aid (cereal disease inv.).*
Washington—Pullman—
Edward F. Gaines, M. S., Sc. D., *Agt. (cereal smut inv.).*
Wisconsin—Madison—
Paul E. Hoppe, B. S., *Agt. (wheat scab inv.).*
Helen Johann, A. M., *Asst. Path. (wheat scab inv.).*
William A. Walker, M. S., *Assoc. Path. (barberry crad.).*
James G. Dickson, M. S., Ph. D., *Agt. (cereal disease inv.).*
Chester Barlow, *Asst. Sci. Aid (wheat scab inv.).*

CITRUS CANKER ERADICATION

Directed by Assoc. Chief of Bureau.
FIELD HEADQUARTERS:
Alabama—Mobile—
John W. Pace, M. S., *Agt.* (delegated by Comr. of Agr. of Alabama to direct all local work pertaining to erad. of citrus canker).
Florida—Gainesville—
Wilmon Newell, M. S., D. Sc., *State Pl. Comr. (Collab.).*
Louisiana—Baton Rouge—
W. E. Anderson, B. S., *State Ent. (Collab.).*
Mississippi—A. & M. College—
R. W. Harned, B. S., *State Ent. (Collab.).*
Texas—Austin—
J. M. Del Curto, B. S., *State Path (Collab.).*

COTTON, RUBBER, AND OTHER TROPICAL PLANTS

O. F. Cook, Ph. B., *Sr. Bot., in charge.*
Crop Acclimatization, Cotton Breeding, and Rubber Production Investigations.
C. B. Doyle, *Agron.*
L. G. Polhamus, *Chief Sci. Aid.*
R. L. Taylor, *Sr. Sci. Aid.*
A. D. Harvey, *Asst. Sci. Aid.*
FIELD STATIONS:
Arizona—Sacaton (U. S. Field Station)—
C. J. King, B. S., *Assoc. Agron. and Supt.*
J. S. Townsend, *Assoc. Technol.*
F. M. Eaton, M. S., Ph. D., *Asst. Physiol.*
H. F. Loomis, *Asst. Agron.*
California—
Bard (U. S. Acclimatization Garden)—
R. E. Beckett, *Prin. Sci. Aid.*
J. W. Hubbard, *Asst. Sci. Aid.*
R. S. Stitt, *Asst. Sci. Aid.*
Indio—
H. G. McKeever, *Jr. Agron.*
Shafter (U. S. Cotton Field Station)—
W. B. Camp, B. S., *Assoc. Agron.*
P. W. Herbert, *Sr. Sci. Aid.*
G. O. Belden, *Asst. Sci. Aid.*
W. E. Clark, *Asst. Sci. Aid.*
J. F. Schuh, *Asst. Sci. Aid.*
Torrey Pines (U. S. San Diego Acclimatization Garden)—
C. G. Marshall, *Asst. Agron. and Supt.*
Florida—Coconut Grove (Chapman Field Garden)—
Alfred Keys, *Assoc. Hort.*
Haiti—
Bayeux—
Laurence Bolte, *Agt.*

Crop Acclimatization, Cotton Breeding, and Rubber Production Investigations—Con.

FIELD STATIONS—Continued.

Halti—Continued.

Thor—

F. C. Baker, B. S., *Technol. and Supt.*

W. H. Jenkins, B. S., *Asst. Agron.*

New Mexico—State College (U. S. Acclimatization Field Station):

A. R. Leding, *Chief. Sci. Aid.*

L. R. Lytton, *Asst. Sci. Aid.*

South Carolina—James Island, near Charleston (U. S. Acclimatization Field Station):

D. M. Simpson, B. S., *Asst. Agron.*

W. W. Ballard, *Sr. Sci. Aid.*

Texas—Greenville (U. S. Cotton Breeding Field Station):

H. C. McNamara, B. S., *Assoc. Agron. and Supt.*

D. R. Hooton, B. S., *Asst. Pomol.*

W. P. Snyder, M. S., *Sr. Sci. Aid.*

D. D. Porter, *Asst. Sci. Aid.*

CROP PHYSIOLOGY AND BREEDING

Walter T. Swingle, B. S., M. A., D. Sc., *Sr. Physiol., in charge.*

Citrus Breeding and Life History Studies.

T. Ralph Robinson, A. M., *Physiol.*

Eugene May, jr., *Prin. Sci. Aid.*

Robert J. Bullen, *Sr. Sci. Aid.*

Alan F. Dameron, *Asst. Photographer.*

FIELD HEADQUARTERS:

California — Berkeley (Univ. of Calif.)—

M. J. Hagerty, *Translator of Chinese.*

Florida—Eustis—

E. M. Savage, *Asst. Pl. Breeder.*

Date Investigations.

Walter T. Swingle, B. S., M. A., D. Sc., *Sr. Physiol.*

FIELD HEADQUARTERS:

California—Indio—

F. A. Thackery, *Agr.*

Silas C. Mason, M. S., *Hort.*

A. J. Shamblin, *Assoc. Hort.*

Roy W. Nixon, B. S., *Asst. Hort.*

Smyrna Fig, Pistache, and Miscellaneous Investigations.

California—San Francisco:

G. P. Rixford, C. E., *Assoc. Physiol.*

DRUG, POISONOUS, AND OIL PLANTS

W. W. Stockberger, B. S., Ph. D., *Sr. Physiol., in charge.*

Drug Plants, Volatile Oils, Fixed Oils, and Waste Products Investigations.

Arthur F. Sievers, Pharm. C., B. S., *Biochem.*

Frank Rabak, Pharm. C., B. S., *Assoc. Biochem.*

Morris S. Lowman, B. A., *Jr. Biochem.*

Poisonous Plant Investigations.

Otis F. Black, A. M., *Biochem.*

Willard W. Eggleston, B. S., *Asst. Bot.*

James W. Kelly, Pharm. D., *Jr. Biochem.*

DRY LAND AGRICULTURE

E. C. Chilcott, M. S., *Sr. Agr., in charge.*

John S. Cole, B. S., *Agron.*

NORTHERN FIELD STATIONS (hdqrs., Mandan, N. Dak):

John M. Stephens, B. S., *Sr. Agr. and Supvr., Northern group.*

Colorado—Akron—

Joseph F. Brandon, B. S., *Assoc. Agron., Supt.*

Montana—

Havre—

George W. Morgan, B. S., *Assoc. Agron., Supt.*

Huntley—

Arthur E. Seamans, B. S., *Assoc. Agron.*

Moccasin—

Irving J. Jensen, M. S., *Agt.*

Nebraska—North Platte—

Leslie L. Zook, B. S., *Assoc Physiol.*

Harry E. Weakly, B. S., *Jr. Agron.*

North Dakota—

Dickinson—

Leroy Moomaw, B. S., *Assoc. Agron., Supt.*

Mandan (hdqrs. of Supvr., Northern group)—

William P. Baird, B. S., *Assoc. Agron.*

Johnson T. Sarvis, M. S., *Assoc. Agron.*

John C. Thysell, B. S., *Assoc. Agron.*

Robert Wilson, B. S., *Assoc. Arbor.*

Thomas K. Killand, *Sr. Sci. Aid.*

South Dakota—

Ardmore—

Oscar R. Mathews, M. S., *Assoc. Agron., Supt.*

John D. Kelso, *Sr. Sci. Aid.*

Verner I. Clark, *Sci. Aid.*

Newell—

Albert Osenbrug, B. S., *Assoc. Agron., Supt.*

Wyoming—

Archer—

August L. Nelson, M. S., *Assoc. Agron., Supt.*

Sheridan—

Ray S. Towle, B. S., *Assoc. Agron., Supt.*

SOUTHERN FIELD STATIONS (hdqrs., Woodward, Okla.):

Ellery F. Chilcott, B. S., *Agr. and Supvr., Southern group.*

Kansas—

Colby—

Benjamin F. Barnes, B. S., *Agt., Supt.*

SOUTHERN FIELD STATIONS—Continued.
Kansas—Continued.
Garden City—
Embert H. Coles, B. S., *Assoc. Agron.*
Hays—
Alanson L. Hallsted, B. S., *Assoc. Agron.*
New Mexico—Tucumcari—
Donald R. Burnham, B. S., *Assoc. Agron., Supt.*
Oklahoma—
Lawton—
Walter M. Osborn, B. S., *Assoc. Agron., Supt.*
Woodward (hdqrs. of Supvr., Southern group)—
Lowell F. Locke, B. S., *Assoc. Hort.*
Texas—
Big Spring—
Fred E. Keating, B. S., *Assoc. Agron., Supt.*
Dalhart—
Harry J. Clemmer, B. S., *Assoc. Agron., Supt.*

FIBER PLANTS

Lyster H. Dewey, B. S., *Bot., in charge.*
H. T. Edwards, B. S., *Technol.*

FIELD HEADQUARTERS:
Michigan—East Lansing—
Brittain B. Robinson, M. S., *Jr. Pl. Breeder.*
Porto Rico—Mayaguez—
Rafael Vidal, *Agt.*
Wisconsin—Madison—
A. H. Wright, M. S., *Agt.*

FORAGE CROPS

Russel A. Oakley, B. S., D. Sc., *Sr. Agron., in charge.*

Clovers and Clover-like Legumes.
Adrian J. Pieters, B. S., Ph. D., *Agron.*

Sorghums and Pasture and Meadow Grasses.
Harry N. Vinall, M. S., *Agron.*

Soybeans, Cowpeas, and Miscellaneous Legumes.
William J. Morse, B. S., *Agron.*

Alfalfa, Silage, and Turf Grasses.
Harvey L. Westover, B. S., *Agron.*

Melilotus (Sweet Clover) and Vetches.
Leonard W. Kephart, B. S., *Assoc. Agron.*

Arlington Farm Grass Garden and Greenhouse Work.
Percy L. Ricker, M. S., *Asst. Bot.*

Seed Storage and Shipment.
Fred C. Hall, *Sr. Sci. Aid.*

Field Stations.
South Dakota—Redfield—
Samuel Garver, B. S., *Assoc. Agron., in charge.*

Field Stations—Continued.
Virginia—Rosslyn—
Charles W. Lee, *Sci. Aid, Asst. in field actir.*
Anselm T. Stone, *Sci. Aid, Asst. in field actir.*

Field Stations (Coop.).
Florida—Gainesville—
Charles R. Enlow, M. S., *Agt., in charge.*
Illinois—Urbana—
Eugene A. Hollowell, M. S., *Asst. Agron., in charge.*
Iowa—Ames—
F. Scott Wilkins, M. S., *Agt., in charge.*
Kansas—Hays—
Robert E. Getty, A. B., B. S., *Assoc. Agron., in charge.*
Mississippi—
McNeill—
Hiram R. Reed, B. S., *Asst. Agron., in charge.*
West Point—
Tyler F. Akers, M. S., *Agt., in charge.*
Ohio—North Ridgeville—
Morgan W. Evans, M. S., *Assoc. Agron., in charge.*
Oregon—Corvallis—
Harry A. Schoth, M. S., *Asst. Agron., in charge.*
Washington—
Pullman—
Oscar E. Barbee, M. S., *Agt., in charge.*
Waterville—
Charles E. Hill, B. S., *Agt., in charge.*

FOREIGN PLANT INTRODUCTION

David Fairchild, M. S., D. Sc., *Sr. Agr. Expl., in charge.*

B. T. Galloway, B. Agr. Sc., LL. D., D. Agr., *Sr. Path.*

Roland McKee, B. S., *Hort., Admin.*

Foreign Explorations.
J. A. Stevenson, B. S., *Bot.*
P. H. Dorsett, B. Agr., *Hort.*
Paul G. Russell, B. A., M. S., *Asst. Bot.*

FIELD HEADQUARTERS:
Algeria—Mustapha—
L. Trabut, M. D., *Collab.*
China—
Canton—
Floyd A. McClure, A. B., B. S., *Agr. Expl.*
Yunnan—
Joseph F. Rock, *Collab.*
France—Nice—
A. Robertson Proschowsky, M. D., *Collab.*
New York—New York—
A. V. Armour, *Collab.*

Plant Propagation and Distribution.
C. C. Thomas, A. B., M. S., *Assoc. Hort.*
H. C. Skeels, B. S., *Assoc. Bot.*
F. J. Hopkins, B. A., *Asst. Hort.*
W. R. Poore, *Foreman Gardener.*

FIELD HEADQUARTERS—
California—Chico—
J. E. Morrow, *Supt.*
B. D. Douglas, *Sr. Pl. Prop.*
C. H. Jackson, *Sr. Pl. Prop.*
Henry Klopfer, *Sr. Sci. Aid.*
Florida—
Brooksville—
H. O. Albert, *Collab.*
Callahan—
Ernest Petree, *Collab.*
Coconut Grove—
A. W. Close, *Prin. Sci. Aid.*
Edward Simmonds, *Prin. Sci. Aid.*
D. L. Varmette, *Prin. Sci. Aid.*
Littleriver—
Charles T. Simpson, *Collab.*
Naples—
H. Nehrling, *Collab.*
Georgia—Savannah—
R. A. Young, B. S., *Assoc. Hort., Supt.*
David A. Bisset, *Prin. Sci. Aid.*
Maryland—Glenn Dale—
H. A. Gunning, B. S., *Assoc. Hort., Supt.*
Edward Goucher, *Chief Pl. Prop.*
Massachusetts—Jamaica Plain—
E. H. Wilson, A. M., *Collab.*

FOREST PATHOLOGY

Haven Metcalf, A. M., Ph. D., *Sr. Path., in charge.*
R. Kent Beattie, B. S., M. A., *Sr. Path.*
Carl Hartley, A. M., Ph. D., *Path.*
George G. Hedgcock, B. S., A. M., Ph. D., *Path.*
G. F. Gravatt, B. S., A. M., *Assoc. Path.*
Lake S. Gill, *Asst. Path.*
Ruby J. Acree*, *Jr. Path.*
Lyle W. R. Jackson, B. S., *Jr. Path.*
Russell B. Clapper, *Asst. Sci. Aid.*

FIELD HEADQUARTERS—
California—San Francisco—
E. P. Meinecke, Ph. D., *Path.*
Willis W. Wagener, A. B., *Asst. Path.*
Connecticut—New Haven—
Rush P. Marshall, M. S., *Asst. Path.*
Willis R. Hunt, Ph. B., M. S., Ph. D., *Asst. Path.*
J. R. Hunsbrough, Ph. B., A. M., *Agt.*
Massachusetts—Amherst—
Perley Spaulding, M. S., Ph. D., *Path.*
New Mexico—Albuquerque—
W. H. Long, A. M., Ph. D., *Path.*
North Carolina—Asheville—
R. M. Nelson, B. S., M. S., *Asst. Path.*

FIELD HEADQUARTERS—Continued.
Oregon—Portland—
John S. Boyce, B. S., M. F., Ph. D., *Path.*
H. G. Lachmund, A. B., *Asst. Path.*
J. L. Meilke, *Jr. Path.*
C. N. Partington, *Jr. Path.*
Rhode Island—Providence—
J. Franklin Collins, Ph. B., *Path.*
Nathaniel O. Howard, M. S., Ph. D., *Assoc. Path.*
Alma M. Waterman, A. M., *Jr. Path.*
Scotland—Edinburgh—
Glenn G. Hahn, M. S., *Asst. Path.*
Malcom Wilson, B. S., D. C., *Spec. in For. Path.*
Wisconsin—Madison—
Reginald H. Colley, A. M., Ph. D., *Path.*
C. Audrey Richards, A. M., Ph. D., *Asst. Path.*
Caroline T. Rumbold, B. L., A. M., Ph. D., *Asst. Path.*
E. E. Seeliger, *Jr. Sci. Aid.*

FRUIT DISEASES

Merton B. Waite, B. S., D. Agr., *Sr. Path., in charge.*

General Orchard Disease Investigations.
Merton B. Waite, B. S., D. Agr., *Sr. Path.*
J. Marion Shull, *Assoc. Bot.*
Eugene A. Siegler, M. S., *Assoc. Path.*
E. Aline Fenner, A. B., *Jr. Path.*

FIELD HEADQUARTERS—
Georgia—
Fort Valley—
Lee M. Hutchins, B. S., Ph. D., *Assoc. Path.*
Thomasville—
Juan B. Demaree, B. S., *Assoc. Path.*
John R. Cole, M. S., *Jr. Path.*

Citrus and Subtropical Fruit Disease Investigations.
Harry R. Fulton, A. M., *Path.*
John J. Bowman, B. S., *Asst. Path.*

FIELD HEADQUARTERS—
Florida—Orlando—
F. A. Wolf, A. M., Ph. D., *Path.*

Grape and Small Fruit Disease Investigations.
C. L. Shear, B. S., A. M., Ph. D., *Sr. Path.*
Nell E. Stevens, A. M., Ph. D., *Path.*
B. O. Dodge, Ph. B., Ph. D., *Path.*
Angie M. Beckwith, A. B., *Jr. Path.*
Marguerite S. Wilcox, *Sr. Sci. Aid.*
Francis T. Eagan, *Asst. Sci. Aid.*

FIELD HEADQUARTERS—
Ohio—Wooster—
R. B. Wilcox, M. S., *Asst. Path.*

Orchard Spraying Investigations.
John W. Roberts, A. M., Ph. D., *Path.*

FIELD HEADQUARTERS—
Georgia—Fort Valley—
John C. Dunegan, B. S., *Asst. Path.*
Indiana—Vincennes—
Leslie Pierce, *Sr. Sci. Aid.*

Fruit Rots and Spots Investigations.
Charles Brooks, A. M., Ph. D., *Sr. Path.*
J. S. Cooley, M. S., Ph. D., *Assoc. Path.*

FIELD HEADQUARTERS—
Washington—Wenatchee—
D. F. Fisher, B. S., M. H., *Path.*
C. P. Harley, M. S., *Asst. Physiol.*

Physiological Fruit Disease Investigations (field).
California—Fresno—
W. S. Ballard, A. B., *Path.*

Market Pathology Investigations.
Dean H. Rose, A. M., Ph. D., *Assoc. Path.*

FIELD HEADQUARTERS:
Illinois—Chicago—
Lowell F. Butler, B. S., *Asst. Path.*

GARDENS AND GROUNDS

J. Wise Byrnes, *Asst., in charge.*

HORTICULTURE

L. C. Corbett, M. S., D. Agr., *Sr. Hort., in charge.*

Fruit Improvement through Bud Selection (field).
California—Riverside—
A. D. Shamel, B. S., *Sr. Physiol.*
C. S. Pomeroy, Ph. B., B. S., *Assoc. Pomol.*
R. E. Caryl, M. S., *Asst. Pomol.*
Frank N. Harmon, B. S., *Jr. Pomol.*

Fruit and Vegetable Utilization Investigations.
J. S. Caldwell, A. M., Ph. D., *Physiol.*
C. A. Magoon, A. B., Ph. D., *Assoc. Bact.*

FIELD HEADQUARTERS:
Virginia — Rosslyn (Arlington Exp. Farm) —
C. W. Culpepper, M. S., *Assoc. Physiol.*
H. H. Moon, B. S., *Sci. Aid.*

Fruit and Vegetable Handling, Transportation, and Storage Investigations.
Lon A. Hawkins, B. S., Ph. D., *Physiol.*
John R. Magness, M. S., Ph. D., *Physiol.*
R. C. Wright, M. S., *Assoc. Physiol.*
George F. Taylor, A. B., *Biophys.*
Mark H. Haller, M. S., *Jr. Pomol.*

FIELD HEADQUARTERS:
California—
Lamada Park—
Wm. R. Barger, B. S., *Assoc. Physiol.*
Los Angeles—
C. W. Mann, B. S., *Pomol.*

Fruit and Vegetable Handling, etc.—Contd.
FIELD HEADQUARTERS—Continued.
Virginia — Rosslyn (Arlington Exp. Farm) —
Earl D. Mallison, B. S., *Asst. Mkt. Spec.*
W. T. Pentzer, B. S., M. S., *Jr. Mkt. Spec.*
Washington—Wenatchee—
H. C. Diehl, B. S., *Asst. Physiol.*

Fruit Production Investigations.
H. P. Gould, M. S., *Pomol.*
Magdelene R. Newman, *Jr. Libr.*
R. C. Steadman, *Chief Sci. Illustr.*
Amanda A. Newton, *Sci. Illustr.*
Mary D. Arnold, *Sci. Illustr.*

FIELD HEADQUARTERS:
California—Sacramento—
C. F. Kinman, B. S., *Assoc. Pomol.*
Maryland—Glenn Dale—
George M. Darrow, A. M., Ph. D., *Assoc. Pomol.*
George F. Waldo, M. S., *Jr. Pomol.*

Fruit Improvement through Breeding (field).
California—Palo Alto—
William F. Wight, B. S., A. M., *Assoc. Bot.*

Grape Investigations.
George C. Husmann, M. S., *Assoc. Pomol.*

FIELD HEADQUARTERS:
California—
Fresno—
Elmer Snyder, M. S., *Assoc. Pomol.*
Napa—
Frederick L. Husmann, *Supt.*
North Carolina—Willard—
Charles T. Dearing, B. S., *Assoc. Hort.*

Potato Investigations.
William Stuart, M. S., D. Sc., *Hort.*
Charles F. Clark, M. S., Ph. D., *Assoc. Hort.*
W. M. Peacock, M. S. *Assoc. Hort.*

FIELD HEADQUARTERS:
Colorado—Greeley—
W. C. Edmundson, M. S., *Assoc. Hort. and Supt.*
Maine—Presque Isle—
P. M. Lombard, B. S., *Assoc. Hort.*

Truck Crop Production Investigations.
William R. Beattie, M. S., *Hort.*
J. H. Beattie, B. S., *Assoc. Hort.*
E. V. Hardenburg, B. S., M. S. A., Ph. D., *Asst. Hort.*
A. M. Jackson, *Sci. Aid.*

Field Trials of Vegetable Seeds.
D. N. Shoemaker, B. S., Ph. D., *Assoc. Hort.*
E. Q. Knight, *Asst. Sci. Aid.*

Bulb Culture Investigations.

David Griffiths, M. S., Ph. D., *Hort.*

FIELD HEADQUARTERS:

Washington—Bellingham—

B. L. Peters, *Sr. Sci. Aid.*

Howard A. Houser, *Sci. Aid.*

Landscape Gardening and Floriculture Investigations.

F. L. Mulford, B. S., *Assoc. Hort.*

D. V. Lumsden, B. S., *Jr. Hort.*

FIELD HEADQUARTERS:

Maryland—Glenn Dale—

B. Y. Morrison, B. S., M. L. A., *Assoc. Hort.*

Nursery Stock Investigations.

Guy E. Yerkes, B. S., *Assoc. Hort.*

FIELD HEADQUARTERS:

California—Shafter—

L. B. Scott, B. S., *Pomol.*

Maryland—Glenn Dale—

Charles F. Swingle, B. S., *Asst. Pomol.*

Nut Culture Investigations.

Clarence A. Reed, B. S., M. H., *Assoc. Pomol.*

E. R. Lake, M. S., *Asst. Pomol.*

FIELD HEADQUARTERS:

California—Sacramento—

Milo N. Wood, M. S., *Assoc. Pomol.*

Georgia—Phillema—

J. L. Pelham, B. S., *Assoc. Pomol.*

LIBRARY

Jessie M. Allen, *Asst. Libr., in charge.*

Marjorie F. Warner, *Asst. Libr.*

Esther M. Colvin, A. B., *Jr. Libr.*

Helen B. Waterman,* B. A., *Jr. Libr.*

Martha A. Sherman, *Libr. Asst.*

MYCOLOGY AND DISEASE SURVEY

Cornelius L. Shear, B. S., A. M., Ph. D., *Sr. Path., in charge.*

Mycological Collections.

Vera K. Charles, A. B., *Assoc. Path.*

William W. Diehl, M. S., *Assoc. Path.*

Anna E. Jenkins, M. S., *Asst. Path.*

Edith K. Cash, A. B., *Jr. Path.*

Plant Disease Survey.

Royal J. Haskell, Ph. D., *Assoc. Path., in charge.*

G. Hamilton Martin, jr., M. S., *Asst. Path.*

William A. Archer, B. S., Ph. D., *Asst. Path.*

Jessie I. Wood, A. M., *Jr. Path.*

NEMATOLOGY

N. A. Cobb, B. S., Ph. D., *Sr. Nematol., in charge.*

Free-Living, Plant-Infesting, and Insect-Infesting Nemas; Mycorrhizal Investigations.

G. Steiner, B. S., M. A., Ph. D., *Nematol.*

E. G. Arzberger, Ph. B., M. A., *Asst. Path.*

Mary Bradley, A. B., M. A., *Jr. Nematol.*

Edna M. Buhrer, A. B., *Jr. Nematol.*

Helen M. Heinly, A. B., *Jr. Nematol.*

Grace W. Sherman, A. B., *Jr. Nematol.*

Charles B. Bateman, *Sr. Lab. Mech.*

Martin L. Harrison, *Sr. Lab. Mech.*

Margaret N. Corder, *Jr. Sci. Aid.*

Josephine F. Danforth,* *Jr. Sci. Aid.*

Eunice R. Harveycutter,* *Jr. Sci. Aid.*

Gertrude L. Power, *Jr. Sci. Aid.*

Florence E. Woods,* *Jr. Sci. Aid.*

FIELD HEADQUARTERS:

Utah—Salt Lake City—

Gerald Thorne, B. S., M. A., *Assoc. Nematol.*

Virginia—East Falls Church—

J. R. Christie, M. S., *Assoc. Nematol.*

PATHOLOGICAL LABORATORY

Directed by Assoc. Chief of Bureau.

Nellie A. Brown, A. B., *Assoc. Path.*

Charlotte Elliott, A. M., Ph. D., *Assoc Path.*

R. E. B. McKenney, M. S., A. M., Ph. D., *Asst. Path.*

Florence Hedges, A. B., *Asst. Path.*

Lucia McCulloch, B. S. *Asst. Path.*

Mary K. Bryan, A. B., *Asst. Path.*

Helen F. Smart,* A. B., *Jr. Path.*

Lillian C. Cash, A. B., *Jr. Path.*

Agnes J. Quirk, *Sr. Sci. Aid.*

Edna H. Fawcett, B. L., *Jr. Path.*

James F. Brewer, *Chief Sci. Illustr.*

PLANT GEOGRAPHY AND PHYSIOLOGY

Directed by Assoc. Chief of Bureau.

Plant Geography in Relation to Plant Industry.

R. L. Piemeisel, A. B., *Assoc. Physiol.*

Plant Physiological Investigations.

Frank L. Goll, *Physiol.*

H. Hasselbring, Ph. D., *Assoc. Physiol*

S. L. Jodidi, B. S., Ph. D., *Assoc. Biochem.*

Charles E. Sando, M. S., Ph. D., *Assoc. Biochem.*

Maxwell Dressler, *Jr. Sci. Aid.*

SEED LABORATORY

Edgar Brown, Ph. B., *Sr. Bot., in charge.*

Seed Testing.

Emma F. Sirrine, M. S., *Asst. Bot.*

Leuthi D. Bunting, A. B., *Jr. Bot.*

C. Christine Thygeson, B. S., *Jr. Bot.*

Nelle B. Wilkinson, Ph. B., *Jr. Bot.*

Seed Purity and Vitality Investigations.
Eben H. Toole, A. M., Ph. D., *Assoc. Physiol.*
F. H. Hillman, M. S., *Assoc. Bot.*
Helen H. Henry, *Asst. Bot.*
Alice M. Andersen, B. M., A. M., *Jr. Physiol.*

Federal Seed Act.
Willard L. Goss, B. S., LL. B., *Assoc. Bot.*
Emma F. Sirrine, M. S., *Asst. Bot.*
Alma L. Eggleston,* B. S., *Jr. Bot.*

Field Laboratories.
California—Sacramento—
Grace M. Cole, A. B., *Asst. Bot.*
Indiana—Lafayette—
Regina B. Schulte, A. B., *Jr. Bot.*
Missouri—Columbia—
Clara Fuhr, M. S., *Jr. Bot.*
Oregon—Corvallis—
Bertha C. Hite, A. B., *Asst. Bot.*

SUGAR PLANTS

E. W. Brandes, M. S., Ph. D., *Sr. Path., in charge.*

Sugar-Beet Investigations.
Ernst Artschwager, B. S., Ph. D., *Assoc. Path.*
S. F. Sherwood, B. S., *Assoc. Biochem.*
Ruth C. Starrett*, M. A., *Asst. Cytol.*
Field Headquarters:
California—Riverside—
Eubanks Carsner, B. A., M. S., Ph. D., *Assoc. Path.*
C. F. Lackey, B. S., *Jr. Path.*
Colorado—
Fort Collins—
W. W. Tracy, jr., B. S., *Assoc. Agron.*
Rocky Ford—
G. H. Coons, A. M., Ph. D., *Path.*
Dewey Stewart, M. S., *Asst. Path.*
Michigan—East Lansing—
J. G. Lill, M. S., *Assoc. Agron.*
E. E. Down, B. S., M. A., *Agt.*
Charles A. Lavis, B. S., *Agt.*
New Mexico—State College—
John C. Overpeck, M. S., *Agt.*
Utah—
Logan—
C. M. Tompkins, B. S., Ph. D., *Asst. Path.*
Salt Lake City—
S. B. Nuckols, B. S., A. M., *Assoc. Agron.*
Dean A. Pack, A. B., Ph. D., *Assoc. Agron.*

Sugar-Cane Investigations.
R. D. Rands, M. S., Ph. D., *Path.*
P. A. Yoder, A. M., Ph. D., *Assoc. Technol.*
Ernst Artschwager, B. S., Ph. D., *Assoc. Path.*

Sugar-Cane Investigations—Continued.
S. F. Sherwood, B. S., *Assoc. Biochem.*
G. B. Sartoris, M. S., Ph. D., *Assoc. Path.*
Ruth C. Starrett*, M. A., *Asst. Cytol.*
Field Headquarters:
Florida—Canal Point—
B. A. Bourne, B. S., *Asst. Path.*
C. P. Sheffield, *Agt.*
Georgia—Cairo—
P. A. Yoder, A. M., Ph. D., *Assoc. Technol.*
Louisiana—Houma—
F. D. Stevens, M. S., *Assoc. Agron.*

Sorgo Investigations (field).
Arkansas—Fort Smith:
H. B. Cowgill, M. S. A., *Asst. Agron.*

TOBACCO AND PLANT NUTRITION

W. W. Garner, A. B., Ph. D., *Sr. Physiol, in charge.*

Cigar Filler Production Investigations (field).
New York—Baldwinsville:
G. W. Harris, *Prin. Sci. Aid.*
Pennsylvania—Ephrata:
Otto Olson, *Assoc. Agron.*

Flue-Cured Tobacco Production Investigations (field).
Georgia—Tifton:
J. M. Carr, B. S., *Agt.*
North Carolina:
Oxford—
E. G. Moss, B. S., *Agron.*
Rocky Mount—
J. P. Young, *Sci. Aid.*

Burley Tobacco Production Investigations (field).
West Virginia—Lakin:
T. C. McIlvaine, M. S., Ph. D., *Agt.*

Maryland Tobacco Production Investigations (field).
Maryland—Upper Marlboro:
D. E. Brown, *Prin. Sci. Aid.*

Dark Air-Cured Tobacco Production Investigations (field).
Virginia—Bowling Green:
W. W. Green, *Agt.*

Dark Fire-Cured Tobacco Production Investigations (field).
Tennessee—Clarksville:
H. W. Jones, *Agt.*

Tobacco-Disease Investigations (field).
Georgia—Tifton:
R. C. Thomas, M. S., *Agt.*
Massachusetts—Amherst:
H. F. Murwin, B. S., *Agt.*
Wisconsin—Madison:
James Johnson, M. S., Ph. D., *Agt.*

Physiology and Nutrition of the Tobacco Plant.
W. M. Lunn, M. S., *Assoc. Agron.*
J. E. McMurtrey, jr., B. S., *Asst. Physiol.*
J. D. Bowling, jr., B. S., *Asst. Biochem.*

Effect of Length of Day on Plant Growth.
H. A. Allard, B. S., *Physiol.*
C. W. Bacon, A. M., Ph. D., *Assoc. Physiol.*
R. A. Steinberg, B. S., M. A., Ph. D., *Asst. Physiol.*

FIELD HEADQUARTERS:
Virginia—Rosslyn (Arlington Exp. Farm)—
A. B. Creed, *Sci. Aid.*

VEGETABLE AND FORAGE DISEASES

Directed by Assoc. Chief of Bureau.

Potato Diseases.
Eugene S. Schultz, M. S., Ph. D., *Path.*
Freeman Weiss, B. S., Ph. D., *Assoc. Path.*

FIELD HEADQUARTERS:
Colorado—Greeley—
Howard G. MacMillan, M. S., Ph. D., *Path.*
Lawrence A. Schaal, M. S., *Asst. Path.*
Oregon—Corvallis—
Marion B. McKay, B. S., M. S., *Agt.*
Philip Brierly, M. S., *Asst. Path.*
Theodore P. Dykstra, M. S., *Jr. Path.*

Tomato Diseases.
Frederick J. Pritchard, B. S., *Physiol.*
William S. Porte, B. S., *Asst. Path.*

FIELD HEADQUARTERS:
California—Riverside—
Michael Shapovalov, B. A., M. S., *Path.*
F. Sidney Beecher, *Sci. Aid.*

Miscellaneous Truck-Crop Diseases.
Leonard L. Harter, M. S., Ph. D., *Path.* (*sweet potato and bean diseases*).
William W. Gilbert, M. S., *Path.* (*cucurbit diseases; also cotton diseases*).
John I. Lauritzen, B. S., Ph. D., *Assoc. Path.* (*storage diseases of vegetables, and mkt. path.*).
Charles Drechsler, M. S., Ph. D., *Assoc. Path.* (*taxonomy of fungi*).
W. A. Whitney, B. S., *Jr. Path.* (*sweet potato and bean diseases*).
Lester E. Barrett, *Sci. Aid* (*culture media preparation*).
C. B. Sumner, *Asst. Sci. Aid* (*sweet potato and bean diseases*).

FIELD HEADQUARTERS:
California—Chula Vista—
Ivan C. Jagger, M. S., *Path.* (*lettuce and misc. truck-crop diseases*).
Norman Chandler, *Asst. Sci. Aid* (*lettuce and misc. truck-crop diseases*).

Miscellaneous Truck-Crop Diseases—Contd.
FIELD HEADQUARTERS—Continued.
Illinois—Chicago—
Glen B. Ramsey, A. M., Ph. D., *Assoc. Path.* (*mkt. path.*).
Alice A. Bailey,* M. S., *Asst. Path.* (*mkt. path.*).
Wisconsin—Madison—
John C. Walker, M. S., Ph. D., *Path.* (*onion and cabbage diseases*).
Sears P. Doolittle, M. S., Ph. D., *Path.* (*mosaic diseases*).
Arthur C. Foster, M. S., *Path.* (*celery diseases*).
Frederick L. Wellman, B. A., M. S., *Agt.* (*onion and cabbage diseases*).
Gustav H. Rieman, B. S., *Agt.* (*bean diseases*).
Herbert R. Angell, B. S., *Agt.* (*onion and cabbage diseases*).

Forage-Crop Diseases (Field).
Kansas—Manhattan—
James L. Weimer, A. B., Ph. D., *Path.*
Oren E. Campbell, *Agt.*
Wisconsin—Madison—
Fred R. Jones, M. S., Ph. D., *Path.*
John Monteith, jr., M. S., Ph. D., *Assoc. Path.*

WESTERN IRRIGATION AGRICULTURE

C. S. Scofield, B. Agr., *Sr. Agr., in charge.*

FIELD HEADQUARTERS:
Arizona—Tucson—
J. F. Breazeale, B. S., *Biochem.*
California—Bard—
E. G. Noble, B. S., *Assoc. Agron., Farm Supt.*
Montana—Huntley—
Daniel Hansen, *Assoc. Agron., Farm Supt.*
Nebraska—Mitchell—
J. A. Holden, B. S., *Assoc. Agron.*
Nevada—Fallon—
Elmer W. Knight, B. S., *Asst. Agron.*
Oregon—Hermiston—
H. K. Dean, B. S., *Assoc. Agron., Farm Supt.*
South Dakota—Newell—
Beyer Anne, B. Agr., *Assoc. Agron., Farm Supt.*
Texas—San Antonio—
George T. Ratliffe, B. S., *Assoc. Agron., Farm Supt.*
George Y. Blair, B. S., *Jr. Pomol.*
Washington—Prosser—
Coulsen C. Wright, B. S., *Asst. Agron., Farm Supt.*

FOREST SERVICE

William B. Greeley, B. L., M. F., M. A., LL. D., *For.*
Edward A. Sherman, B. S., M. F., *Assoc. For.*

OFFICE OF THE FORESTER

Finance and Accounts.

H. I. Loving, *Chief.*
O. A. Zimmerli, *Gen. Asst.*

BRANCH OF OPERATION

Roy Headley, *Asst. For., in charge.*
E. W. Loveridge, B. S., *Insp.*
C. G. Anderson, *Admin. Asst.*
Henry Wold, *Exec. Asst.*
G. M. Randal, *Chief of Maintenance.*

Supply Depot, Ogden, Utah.

Frank Haynie, *Property Asst. and Purchasing Agt.*

BRANCH OF FOREST MANAGEMENT

E. E. Carter, A. B., M. F., *Asst. For., in charge.*
Harry Irion, LL. B., *Admin. Asst.*
Joseph C. Kircher, A. B., M. F., *For. Insp.*
J. A. Fitzwater, M. F., *For. Insp.*

BRANCH OF GRAZING

Will C. Barnes, *Asst. For., in charge.*
C. E. Rachford, *Insp. of Grazing.*
Robert R. Hill, A. B., *Insp. of Grazing.*

BRANCH OF LANDS

L. F. Knelpp, *Asst. For., in charge.*
D. F. McGowan, LL. B., *Insp. of Lands.*
C. H. Squire, A. B., *Insp. of Lands.*

BRANCH OF RESEARCH

Earle H. Clapp, A. B., *Asst. For., in charge.*
R. E. Marsh, B. S., M. F., *Asst. Chief.*
Harry Irion, LL. B., *Admin. Asst.*
Clarke F. Hunn, B. A., *Ed.*

Forest Products.

H. S. Betts, M. E., *Engr., in charge.*
W. D. Brush, B. S., A. M., *For. Exam.*
R. K. Helphenstine, jr., *Stat.*

Forest Experiment Stations.

Edward N. Munns, B. S., M. S. F., *Silv., in charge.*
F. H. Eyre, B. S., *Assoc. Silv.*
Donald Bruce, A. B., M. F., *Silv.*
L. H. Reineke, *Asst Silv. (forest measurements).*
Helen E. Stockbridge, *Libr.*

FIELD HEADQUARTERS:

Arizona—Flagstaff (Southwestern Sta.)—
G. A. Pearson, B. S., M. A., *Silv.*
Herman Krauch, B. S., *Assoc. Silv.*

Forest Experiment Stations—Continued.
FIELD HEADQUARTERS—Continued.
California—Berkeley (California Sta., in coop. with Univ. of Calif.)—
E. I. Kotok, B. A., M. A., *Dir.*
Charles J. Kraebel, M. F., *Silv.*
Duncan Dunning, M. S., *Assoc. Silv.*
A. E. Wieslander, B. A., M. F., *Assoc. Silv.*
H. W. Siggins, B. S., M. F., *Jr. For.*
Colorado—Colorado Springs (Rocky Mountain Sta.)—
J. Roeser, jr., F. E., *For. Exam.*
Louisiana—New Orleans (Southern Sta.)—
E. L. Demmon, B. S., M. F., *Assoc. Silv.*
Lenthall Wyman, B. A., M. F., *Assoc. Silv.*
W. G. Wahlenberg, B. S., M. F., *Assoc. Silv.*
L. I. Barrett, B. S., *Jr. For.*
V. L. Harper, A. B., *Jr. For.*
P. C. Wakeley, B. S., M. F., *Jr. For.*
Massachusetts—Amherst (Northeast Sta.), in coop. with Mass. Agr. Coll.—
C. E. Behre, A. B., M. F., *Assoc. Silv.*
M. Westveld, B. S., M. F., *Assoc. Silv.*
P. W. Stickel, A. B., M. S., *Asst. Silv.*
P. R. Gast, A. B., M. S., *Agt.*
Minnesota—
Cloquet (Cloquet Sta.), in coop. with Lake States Sta.—
T. Shantz Hansen, *Asst.*
St. Paul (Lakes States Sta.), in coop. with Univ. of Minn.—
Raphael Zon, A. B., B. S., F. E., *Dir.*
Joseph Kittredge, jr., A. B., M. F., *Silv.*
J. A. Mitchell, B. S., *Silv.*
E. L. Mowat, B. S., M. S. F., *Jr. For.*
J. L. Averell, A. B., M. S. F., *Jr. For.*
Montana—Missoula (Northern Rocky Mountain Sta.)—
R. H. Weldman, A. B., *Dir.*
H. T. Gisborne, B. S. F., *Assoc. Silv.*
Robert Marshall, A. B., M. S., *Jr. For.*
I. T. Haig, B. S. F., *Jr. For.*
G. Kempff, *Jr. For.*
North Carolina—Asheville (Appalachian Sta.)—
Earl H. Frothingham, A. B., M. S. F., *Dir.*

Forest Experiment Stations—Continued.
FIELD HEADQUARTERS—Continued.
North Carolina—Asheville—Contd.
Chas. R. Hursh, A. B., M. S., Ph. D., *Assoc. For. Ecol.*
Clarence F. Korstian, B. S., M. F., Ph. D., *Silv.*
F. W. Haasis, A. B., M. F., *Asst. Silv.*
Jesse H. Buell, A. B., M. S. F., *Jr. For.*
Ivan H. Sims, A. B., *Jr. For.*
A. L. McKinney, A. B., M. F., *Jr. For.*
Ohio—Columbus (Central States Sta.)—
E. F. McCarthy, B. S., M. S. F., *Dir.*
Benard S. Meyer, B. A., M. A., Ph. D., *Assoc. For. Ecol.*
John H. Hanley, A. B., *Jr. For.*
L. F. Kellogg, A. B., M. S. F., *Jr. For.*
Oregon—Portland (Pacific Northwest Sta.)—
T. T. Munger, B. A., M. F., *Dir.*
Walter H. Meyer, A. B., M. F., *Asst. Silv.*
L. A. Isaac, B. S. F., *For. Exam.*
R. E. McArdle, B. S., *Asst. Silv.*
R. H. Westveld, M. F., *Jr. For.*
Pennsylvania— ————, Allegheny Sta.)—
R. D. Forbes, B. A., M. F., *Dir.*
O. M. Wood, B. A., M. S., M. F., *Jr. For.*
A. F. Hough, A. B., M. F., *Jr. For.*

Range Research.
William R. Chapline, B. S., *Insp. of Grazing, in charge.*
William A. Dayton, M. A., *Assoc. Pl. Ecol. (forage inv.).*
FIELD HEADQUARTERS:
Arizona—Continental (Santa Rita Reserve)—
Matt. J. Culley, *Dir.*
New Mexico—Las Cruces (Jornada Reserve)—
Jacob D. Schoeller, B. S. F., *Dir.*
R. S. Campbell, A. B., *Jr. Range Exam.*
R. H. Canfield, B. S. F., *Jr. Range Exam.*
Utah—Ogden (Great Basin Exp. Sta.)—
Clarence L. Forsling, B. S., *Dir.*
Enoch W. Nelson, B. S., *Assoc. Range Exam.*

Economic Investigations.
R. E. Marsh, B. S., M. F., *in charge.*
W. N. Sparhawk, B. A., M. F., *For Econ.*
R. V. Reynolds, B. S., *For. Exam.*
A. H. Pierson, B. A., *For. Exam.*
C. W. Boyce, A. B., M. A., *For. Exam.*

Economic Investigations—Continued.
Forest Taxation:
Fred R. Fairchild, B. A., Ph. D., *For. Taxation Econ.*
H. H. Chapman, B. S., B. Agr., M. F., *Sr. For.*
R. Clifford Hall, B. S., M. F., *Sr. For.*
L. S. Murphy, B. S., M. F., *For. Econ.*
P. A. Herbert, B. F., M. F., *Assoc. For.*
C. H. Hammar, B. S., *Asst. For.*
Daniel Pingree, B. S., M. F., *Jr. For.*

Forest Products Laboratory, Madison, Wis.
Carlile P. Winslow, Ph. B., *Dir.*
Aldo Leopold, Ph. B., M. F., *Assoc. Dir.*
Ray C. Tuttle, B. A., *Admin. Off.*
E. F. White, M. F., *For.*
Kiln Drying:
H. D. Tiemann, M. E., M. F., *Phys. and Expert in Kiln Drying, in charge.*
E. C. Peck, Ph. B., M. F., *Asst. Wood Technol.*
Publication of Results:
Thomas J. Mosley, M. A., *Tech. Reviewer, acting in charge.*
Wallace W. Weber, M. S. F., *Assoc. For.*
Francis J. Champion, *Sr. Sci. Illustr.*
Derived Products:
L. F. Hawley, Ph. D., *Sr. Chem., in charge.*
E. C. Sherrard, Ph. D., *Chem., Asst.*
E. Bateman, Ph. B., *Chem.*
R. H. Baechler, Ph. D., *Asst. Chem.*
Ed. Beglinger, *Jr. Chem.*
P. B. Davidson, Ph. D., *Asst. Chem.*
L. C. Fleck, Ph. D., *Asst. Chem.*
Geo. J. Ritter, Ph. D., *Assoc. Chem.*
H. K. Salzberg, M. S., *Jr. Chem.*
A. J. Stamm, Ph. D., *Assoc. Chem.*
Pulp and Paper:
C. E. Curran, Ph. D., *Chem., Asst.*
P. K. Baird, M. A., *Assoc. Chem.*
M. W. Bray, M. S., *Assoc. Chem.*
G. H. Chidester, B. S., *Asst. Chem.*
R. H. Doughty, B. S., *Jr. Engr.*
W. H. Monsson, B. S., *Asst. Engr.*
C. E. Peterson, B. S., *Jr. Chem.*
E. R. Schafer, B. S., *Assoc. Engr.*
J. A. Staidl, M. S., *Asst. Engr.*
B. S. Summers, B. S., *Consult Chem. Engr.*
Timber Mechanics:
J. A. Newlin, B. S., *Sr. Engr., in charge.*
L. J. Markwardt, C. E., *Engr., Asst.*
T. A. Carlson, M. S., *Asst. Engr.*
J. M. Gahagan, *Asst. Engr.*
H. S. Grenoble, M. S., *Assoc. Engr.*
Geo. E. Heck, M. S., *Engr.*
R. F. Luxford, M. S., *Assoc. Engr.*
I. B. Lanphier, C. E., *Assoc. Engr.*

Forest Products Laboratory, Madison, Wis.—Continued.

Timber Mechanics—Continued.
B. H. Paul, M. F., *Assoc. Silv.*
C. A. Plaskett, C. E., *Engr.*
G. W. Trayer, C. E., *Engr.*
T. R. C. Wilson, C. E., *Engr.*

Timber Physics:
Rolf Thelen, B. S., *Engr., in charge.*
J. S. Mathewson, M. E., *Engr., Asst.*
L. L. DeFlon, M. S., *Asst. Wood Technol.*
W. K. Loughborough, *Asst. Engr.*
L. V. Teesdale, *Engr.*

Biology:
Carlos G. Bates, B. S. F., *Silv., in charge.*

Wood Technology—
Arthur Koehler, B. S., *Spec. in Wood Structure, in charge.*
Eloise Gerry, Ph. D., *Micros.*
Gertrude Griffin, *Xylotomist.*
M. Y. Pillow, B. S., *Jr. Wood Technol.*
A. I. Weinstein, Ph. D., *Asst. Physiol., Pl. Anatomist.*

Wood Preservation:
Geo. M. Hunt, B. S., *Chem., in charge.*
Don Brouse, M. S., *Jr. Engr.*
F. L. Browne, Ph. D., *Assoc. Chem.*
M. E. Dunlap, B. S., *Engr.*
C. A. Harrison, *Jr. Engr.*
C. E. Hrubesky, M. S., *Jr. Chem.*
J. D. MacLean, M. E., *Engr.*
T. R. Truax, M. S., *Wood Technol.*
R. M. Wirka, B. S., *Assoc. Engr.*

Industrial Investigations:
Carroll V. Sweet, M. F., *Engr., in charge.*
R. D. Garver, B. S., *For., Asst.*
A. O. Benson, B. S., *Wood Technol.*
J. B. Cuno, M. F., *Assoc. Wood Technol.*
E. M. Davis, M. F., *Assoc. Wood Technol.*
Geo. E. French, M. F., *Asst. Wood Technol.*
W. E. Griffee, B. S., *Jr. Wood Technol.*
R. P. A. Johnson, M. S., *Assoc. Engr.*
Raymond Miller, B. S., *Asst. Engr.*
G. C. Morebeck, M. F., *Assoc. Wood Technol.*

Pathology (in coop. with Bur. of Pl. Ind.):
R. H. Colley, A. M., Ph. D., *Path., in charge.*
C. Audrey Richards, A. M., Ph. D., *Asst. Path.*
Caroline T. Rumbold, A. M., Ph. D., *Asst. Path.*

Laboratory Operation:
A. L. Helm, B. S., *Engr., acting in charge.*
C. P. Jucknem, *Asst.*
M. E. Dilemer, Ph. D., *Assoc. Chem.*
Ellen Hoffman, *Prin. Libr. Asst.*
B. L. Nelson, B. A., *Assoc. Engr.*

Forest Products Laboratory, Madison, Wis.—Continued.

Finance and Accounts:
W. E. Thompson, A. B., *Fiscal Agt., in charge.*
S. H. Busch, *Dep. Fiscal Agt.*

BRANCH OF ENGINEERING

T. W. Norcross, B. S. (C. E.), *Chief Engr., in charge.*
G. H. Lautz, B. S. (C. E.), *Asst. Chief Engr.*
M. S. Wright, *Asst. Engr.*

Maps and Surveys.
M. S. Wright, *Asst. Engr., in charge.*
Helen B. Smith, *in charge of Wash. off. (and map reproduction).*
J. M. Witherow, *Chief Draftsman.*
E. S. Shipp, *Chief Photographer.*
G. B. Bruce, *in charge of Atlas records.*

Roads.
G. H. Lautz, B. S. (C. E.), *Asst. Chief Engr.*

Water Power.
T. W. Norcross, B. S. (C. E.), *Chief Engr.*

BRANCH OF PUBLIC RELATIONS

R. Y. Stuart, M. A., M. F., *Asst. For., in charge.*

Special Assignments.
Herbert A. Smith, B. A., Ph. D., *Asst. For.*

Cooperation with Timberland Owners.
Austin Cary, M. A., Sc. D., *Log. Engr.*

Division of State Cooperation.
J. G. Peters, A. B., M. F., *For. Insp., in charge.*
A. B. Hastings, A. B., M. F., *Insp.*
H. L. Baker, B. S., *Asst. Insp.*
C. R. Tillotson, B. S., *Dist. For. Insp.*
G. T. Backus, F. E., *Dist. For. Insp.*
C. F. Evans, A. B., M. F., *Dist. For. Insp.*
H. N. Wheeler, M. A., *Asst. Insp.*
Jeannie S. Peyton, *Law Compiler.*

Farm Forestry.
G. H. Collingwood, B. S., M. A., *Ext. For.* (with Off. of Coop. Ext. Work).
W. R. Mattoon, A. B., M. F., *Ext. For.*

Division of Information.
Ward Shepard, A. B., M. F., *For. Insp., in charge.*
L. C. Everard, M. A., *Ed., and in charge of Educational Coop.*
C. M. Ballard, *Chief of Pubs.*
C. E. Randall, A. B., *in charge of Information for the Press.*
H. R. Kylie, *in charge of Visual Education.*
Edward Burkholder, *in charge of Printing and Distribution.*

DISTRICT 1—Northern District

Montana, northeastern Washington, northern Idaho, and northwestern South Dakota (hdqrs., Missoula, Mont.).
Fred Morrell, B. S., M. F., *Dist. For.*

Public Relations.
Theodore Shoemaker, *in charge.*
K. D. Swan, B. S., M. F., *Asst.*

Finance and Accounts.
O. M. Wold, *Dist. Fiscal Agt.*
S. E. Schoonover, *Dep. Fiscal Agt.*

Operations.
L. C. Stockdale, *Asst. Dist. For.*
G. I. Porter, *Admin. Asst.*
W. P. Hillman, *Exec. Asst.*
Fire Protection:
Howard R. Flint, *Insp.*
Improvements:
D. L. Beatty, *Insp.*
R. A. Phillips, *Insp., Trails.*
Law Enforcement:
P. J. O'Brien, LL. B., *Insp.*
State Cooperative Fire Protection under Clarke-McNary Act:
R. N. Cunningham, B. S., *Insp.*
Maintenance:
O. C. Bradeen, *Purchasing Agt., in charge.*

Forest Management.
Elers Koch, B. S., M. F., *Asst. Dist. For.*
Wilfred W. White, M. S., M. S. F., *Admin. Asst.*
Logging Engineering:
Phillip Neff, *Dist Log. Engr.*
Clyde S. Webb, *Log. Engr.*
Planting (Haugan, Mont.):
D. S. Olson, *in charge.*
G. W. Jones, *in charge, Savenac Nursery.*
Forest Insect Investigations (Coeur d' Alene, Idaho):
J. C. Evenden, *Ent.*
Products:
S. V. Fullaway, jr., B. S., M. F., *in charge.*
M. Bradner, B. S. F., *Asst.*
C. N. Whitney, Ph. B., M. F., *Tech. Asst.*

Range Management.
Glen A. Smith, *Asst. Dist. For.*
Thomas Lommasson, *Admin. Asst.*
Arthur Cramer, B. S., *Asst. Range Exam.*
H. E. Schwan, *Jr. Range Exam.*

Lands.
M. H. Wolff, Ph. B., M. F., *Asst. Dist. For.*
J. B. Seely, *Off. Asst.*
Land Exchange:
H. G. Ade, B. S. F., *Insp.*
F. K. Stewart, *Chief Surv.*
Claims:
C. A. McElroy, *Chief Mineral Exam.*

Engineering.
F. E. Thieme, B. S. (C. E.), *Dist. Engr.*
Maps and Surveys:
J. B. Yule, *Asst. Dist. Engr.*
Frank J. Cool, *Chief Draftsman.*
W. P. Stephenson, *Chief Surv. (entry surveys).*
Roads:
F. E. Thieme, B. S. (C. E.), *Dist. Engr.*
H. A. Calkins, *Project Engr.*
W. P. Stephenson, *Chief Surv.*
Water Power:
F. E. Thieme, B. S. (C. E.), *Dist. Engr.*
Harold Townsend, *Chief Surv.*
Richard P. Hilleary, *Chief Surv.*

National Forests.
Idaho:
Clearwater (hdqrs., Orofino, Idaho)—
Paul A. Wohlen, *Supvr.*
Paul H. Gerrard, B. S. F., *Asst. Supvr.*
J. L. Rutledge, *Asst. Supvr.*
Coeur d'Alene (hdqrs., Coeur d'Alene, Idaho)—
Charles K. McHarg, jr., Ph. B., M. F., *Supvr.*
A. J. Roche, *Asst. Supvr.*
Howard Drake, *Log. Engr.*
Thomas Crossley, *Chief Lumberman.*
N. Johnson, *Sr. Lumberman.*
H. H. Gurley, B. S. F., *Tech. Asst.*
R. K. Day, B. S. F., *Tech. Asst.*
Nezperce (hdqrs., Grangeville, Idaho)—
Leon C. Hurtt, B. S., *Supvr.*
Guy M. Brandborg, *Asst. Supvr.*
C. D. Blake, *Asst. Supvr.*
Pend Orellle (hdqrs., Sandpoint, Idaho)—
E. T. Wolf, B. S. F., *Supvr.*
C. P. Fickes, *Asst. Supvr.*
G. M. De Jarnette, B. S. F., *Tech. Asst.*
Selway (hdqrs., Kooskia, Idaho)—
Kenneth Wolfe, B. S., *Supvr.*
Chas. A. MacGreggor, *Asst. Supvr.*
J. C. Urquhart, *Asst. Supvr.*
St. Joe (hdqrs., St. Maries, Idaho)—
Eldon M. Myrick, *Supvr.*
James F. Brooks, B. S. F., *Asst. Supvr.*
Frank Foltz, B. S. F., *Asst. Supvr.*
George C. Earle, *Sr. Lumberman.*
Montana:
Absaroka (hdqrs., Livingston, Mont.)—
G. E. Martin, *Supvr.*
Wm. M. Rush, *Asst. Supvr.*
Beartooth (hdqrs., Billings, Mont.)
R. Trevor Ferguson, B. S., *Supvr.*
Benverhead (hdqrs., Dillon, Mont.)
John B. Somers, C. E., *Supvr.*
H. W. Elofson, B. S. F., *Tech. Asst.*
W. G. Hoar, B. S., *Tech. Asst.*
Bitterroot (hdqrs., Hamilton, Mont.)
John W. Lowell, *Supvr.*
A. C. Adams, *Asst. Supvr.*

National Forests.—Continued.
Montana—Continued.
Blackfeet (hdqrs., Kalispell, Mont.)—
James E. Ryan, *Supvr.*
Adolph Weholt, *Asst. Supvr.*
J. H. Bosworth, *Chief Lumberman.*
Cabinet (hdqrs., Thompson Falls, Mont.)—
Ray R. Fitting, *Supvr.*
Carl H. Sirin, *Asst. Supvr.*
C. F. Makibbin, B. S. F., *Tech. Asst.*
Custer (hdqrs., Miles City, Mont.)—
Alva A. Simpson, *Supvr.*
Earl D. Sandvig, B. S., *Asst. Supvr.*
E. W. Hartwell, B. S. F., *Tech. Asst.*
Deerlodge (hdqrs., Butte, Mont.)—
John B. Taylor, A. B., M. F., *Supvr.*
J. N. Templer, *Asst. Supvr.*
Flathead (hdqrs., Kalispell, Mont.)—
Lloyd G. Hornby, A. B., M. S. F., *Supvr.*
C. J. Hash, *Asst. Supvr.*
W. I. White, B. S. F., *Asst. Supvr.*
James N. Diehl, B. S., *Ranger.*
Gallatin (hdqrs., Bozeman, Mont.)—
Burr W. Clark, *Supvr.*
C. B. Swim, *Asst. Supvr.*
Helena (hdqrs., Helena, Mont.)—
Arthur H. Abbott, *Supvr.*
H. H. Hendron, B. S. F., *Tech. Asst.*
Jefferson (hdqrs., Great Falls, Mont.)—
Wilford B. Willey, M. F., *Supvr.*
A. A. Brown, B. S. F., *Asst. Supvr.*
Kootenai (hdqrs., Libby, Mont.)—
Frank J. Jefferson, *Supvr.*
Justin K. Dwinelle, *Asst. Supvr.*
K. A. Klehm, *Chief Lumberman.*
J. S. Baird, *Sr. Lumberman.*
Timber Surveys—
R. W. Billings, B. S. F., *Tech. Asst.*
Lewis and Clark (hdqrs., Choteau, Mont.)—
Wm. E. Lockhart, *Supvr.*
A. D. Moir, *Asst. Supvr.*
Lolo (hdqrs., Missoula, Mont.)—
Chas. D. Simpson, B. S., *Supvr.*
Thomas A. Clapp, B. S., *Asst. Supvr.*
Madison (hdqrs., Sheridan, Mont.)—
Walter J. Derrick, *Supvr.*
F. T. Carroll, *Asst. Supvr.*
Missoula (hdqrs., Missoula, Mont.)—
W. M. Nagel, B. S. F., *Supvr.*
John H. Clack, *Asst. Supvr.*
Washington:
Kaniksu (hdqrs., Newport, Wash.)—
James C. Whitham, B. S. F., *Supvr.*
A. N. Cochrell, *Asst. Supvr.*
I. V. Anderson, B. S. F., *Asst. Supvr.*
A. B. Bowman, B. S., *Tech. Asst.*
J. E. Breen, *Log. Engr.*
Louis W. Fuess, B. S. F., *Tech. Asst.*
F. M. Cosslit, B. S., *Tech. Asst.*

DISTRICT 2—Rocky Mountain District

Colorado, Wyoming, South Dakota, Nebraska, Michigan, Minnesota, northwestern Illinois, and western Oklahoma (hdqrs., Denver, Colo.).
Allen S. Peck, Ph. B., *Dist. For.*

Public Relations.
H. D. Cochran, A. B., B. S. F., *Off. Chief.*

Law.
W. J. Ise, *Dist. Law Off.*

Finance and Accounts.
Joel I. Buckner, *Dist. Fiscal Agt.*
V. W. Campbell, *Dep. Fiscal Agt.*

Operation.
C. J. Stahl, *Asst. Dist. For.*
Peter Keplinger, Pd. B., M. S. F., *Tech. Asst. (training).*
M. R. Kennedy, *Admin. Asst. (maintenance).*

State Cooperative Fire Protection under Clarke-McNary Law.
Michigan, Minnesota, and Wisconsin (hdqrs., Duluth, Minn.):
Crosby A. Hoar, B. A., M. F., *Insp.*

Forest Management.
M. W. Thompson, B. S., M. F., *Asst. Dist. For.*
John W. Spencer, B. A., M. F., *Admin. Asst.*
Fred R. Johnson, B. S., M. F., *Tech. Asst. (planting).*
J. A. Donery, *Log. Engr.*

Range Management.
John H. Hatton, B. S., *Asst. Dist. For.*
Lynn H. Douglas, B. S. A., *Admin. Asst.*

Lands.
Earl W. Tinker, B. S., M. F., *Asst. Dist. For.*
T. M. Moorman, LL. B., *Admin. Asst.*

Engineering.
J. L. Brownlee, C. E., Ch. E., M. E., *Dist. Engr.*
Ross Phillips, *Off. Chief (minor roads and trails).*
F. E. Washburn (*drafting*).
Riley Cass, jr., *Surv.*
Holland Coleman, *Surv.*
James P. Reddick, *Surv.*
Thomas J. Watkins, *Supt. Road Const.*
John B. Cammann, *Supt. Road Const.*

National Forests.
Colorado:
Arapaho (hdqrs., Hot Sulphur Springs, Colo.)—
John V. Leighou, B. S. F., *Supvr.*
Wm. L. Robb, B. S., *Admin. Asst.*
Cochetopa (hdqrs., Salida, Colo.)—
Chas. B. Mack, *Supvr.*
Eric A. Johnson, B. S. F., *Admin. Asst.*

National Forests—Continued.
Colorado—Continued.
Colorado (hdqrs., Fort Collins, Colo.)—
Wm. R. Kreutzer, LL. B., *Supvr.*
Arthur L. Nelson, B. S. F., *Admin. Asst.*
Grand Mesa (hdqrs., Grand Junction, Colo.)—
Ray Peck, *Supvr.*
Gunnison (hdqrs., Gunnison, Colo.)—
Theodore Krueger, *Supvr.*
Ray R. Clarke, *Admin. Asst.*
Holy Cross (hdqrs., Glenwood Springs, Colo.)—
Harold L. Borden, B. S. F., *Supvr.*
Victor J. Dayharsh, *Admin. Asst.*
Leadville (hdqrs., Leadville, Colo.)—
Lewis R. Rist, *Supvr.*
Allen F. Miller, B. S. F., *Admin. Asst.*
C. E. Oakley, *Tech. Asst.*
Montezuma (hdqrs., Mancos, Colo.)—
A. F. C. Hoffman, B. S. F., *Supvr.*
Fred Stell, B. S. F., *Admin. Asst.*
Pike (hdqrs., Colorado Springs, Colo.)—
Everard S. Keithley, *Supvr.*
Harry D. Petheram, *Admin. Asst.*
Gunnar K. Fenger, B. S. F., *Tech. Asst.*
Paul B. Lister, M. F., *Tech. Asst.*
W. H. Schrader, *Nurseryman, Monument Nursery, Monument, Colo.*
Rio Grande (hdqrs., Monte Vista, Colo.)—
Robert E. Clark, Ph. B., M. F., *Supvr.*
L. C. Anderson, B. S. F., *Admin. Asst.*
Routt (hdqrs., Steamboat Springs, Colo.)—
Phillip V. Woodhead, *Supvr.*
Wm. B. Fay, *Admin. Asst.*
San Isabel (hdqrs., Pueblo, Colo.)—
H. E. French, B. S., M. F., *Supvr.*
San Juan (hdqrs., Durango, Colo.)—
Andrew Hutton, B. S. F., *Supvr.*
Wm. P. Apgar, B. S., M. F., *Admin. Asst.*
Uncompahgre (hdqrs., Delta, Colo.)—
S. D. Anderson, B. S., *Supvr.*
White River (hdqrs., Glenwood Springs, Colo.)—
James A. Blair, *Supvr.*
Karl L. Janouch, B. S. A., *Admin. Asst.*
Michigan:
Michigan (hdqrs., East Tawas, Mich.)—
R. G. Schreck, B. F. S., *Supvr.*
Ralph H. Johnson, *Nurseryman.*
H. C. Turner, B. S., *Nurseryman.*
Minnesota:
Minnesota (hdqrs., Cass Lake, Minn.)—
G. E. Marshall, *Supvr.*
Howard Hopkins, B. A., M. F., *Admin. Asst.*
Calvin B. Stott, B. S., M. F., *Tech. Asst.*

National Forests—Continued.
Minnesota—Continued.
Superior (hdqrs., Ely, Minn.)—
A. G. Hamel, B. S. F., *Supvr.*
R. U. Harmon, B. S. F., *Admin. Asst.*
Wm. L. Barker, jr., B. S., *Admin. Asst.*
Nebraska:
Nebraska (hdqrs., Halsay, Nebr.)—
Jay Higgins, B. S. F., *Supvr.*
Oklahoma;
Wichita (hdqrs., Cache, Okla.)—
Harry H. French, *Supvr.*
South Dakota:
Black Hills (hdqrs., Deadwood, S. Dak.)—
Geo. A Duthie, B. A., M. S. F., *Supvr.*
Fritz J. Poch, B. S. F., *Admin. Asst.*
Harney (hdqrs., Custer, S. Dak.)—
James F. Conner, *Supvr.*
Paul L. Ginter, B. S., *Admin. Asst.*
Wyoming:
Bighorn (hdqrs., Sheridan, Wyo.)—
Fred B. Agee, *Supvr.*
C. L. Van Giesen, B. S., M. F., *Admin. Asst.*
Hayden (hdqrs., Encampment, Wyo.)—
James Blackhall, *Supvr.*
Medicine Bow (hdqrs., Laramie, Wyo.)—
Huber C. Hilton, B. S. F., *Supvr.*
D. E. Clark, B. S., *Admin. Asst.*
Shoshone (hdqrs., Cody, Wyo.)—
J. N. Langworthy, *Supvr.*
Washakie (hdqrs., Lander, Wyo.)—
Wallace J. Pearce, *Supvr.*

DISTRICT 3—Southwestern district.

Arizona and New Mexico (hdqrs., Albuquerque, N. Mex.).
Frank C. W. Pooler, *Dist. For.*

Law.
E. S. French, LL. B., M. P. L., *Dist. Law Off.*

Finance and Accounts.
Albert Morris, *Dist. Fiscal Agt.*
H. B. Herms, *Dep. Fiscal Agt.*

Operation.
H. G. Calkins, B. S., *Asst. Dist. For.*
James F. Mullen, *Dist. For. Insp.*
Stanley F. Wilson, A. B., M. F., *Dist. For. Insp.*
Edward P. Aucoin, B. S. F., *Sr. Admin. Asst. (maintenance).*

Forest Management.
Quincy Randles, B. S., M. S. F., *Asst. Dist. For.*
D. M. Lang, *Log. Engr.*
H. Basil Wales, B. F., M. F., *Dist. For. Insp.*
W. H. Long, A. M., Ph. D., *Consult. Path. (Bur. of Pl. Ind.).*

Range Management.
John Kerr, *Asst. Dist. For.*
David A. Shoemaker, *Grazing Exam.*
Ralph W. Hussey, B. S., *Assoc. Range Exam.*

Grazing Reconnaissance.
W. G. Koogler, *Chief of Party.*
R. V. Boyle, *Jr. Range Exam.*
L. W. Rogers, *Jr. Range Exam.*
T. L. Heggie, B. S., *Jr. Range Exam.*

Range Investigations.
V. K. Cooperrider, B. S., *Assoc. Range Exam.*
R. F. Copple, B. S., *Jr. Range Exam.*

Lands:
M. M. Cheney, LL. B., *Asst. Dist. For.*
H. D. Burrall, B. F. S., *Jr. For.*
Luther Schnur, A. B., M. A., *Jr. For.*

Engineering.
C. A. Long, C. E., *Dist. Engr.*
R. L. Hughes, *Asst. Dist. Engr.* (*roads*).

Public Relations.
John D. Jones, A. B., J. D., *Asst. Dist. For.*

National Forests.
Arizona:
Apache (hdqrs., Springerville, Ariz.)—
K. C. Kartchner, *Supvr.*
J. C. Ronk, B. S. F., *Asst. Supvr.*
Coconino (hdqrs., Flagstaff, Ariz.)—
E. G. Miller, A. B., *Supvr.*
Robt. M. Munro, *Asst. Supvr.*
Fred Merkle, *Chief Lumberman.*
Lloyd A. Wall, B. S., M. S., *Asst. Range Exam.*
Arthur B. Young, E. M., *Supt. of Road Const.*
Kimberlin Carlisle, *Sr. Lumberman.*
Robt. F. Rhinehart, *Sr. Lumberman.*
Homer E. German, *Sr. Lumberman.*
Coronado (hdqrs., Tucson, Ariz.)—
Frederic Winn, B. S., *Supvr.*
C. W. McKenzie, *Asst. Supvr.*
Wm. John Anderson, *Asst. Supvr.*
Crook (hdqrs., Safford, Ariz.)—
Rex King, A. B., M. S. F., *Supvr.*
C. E. Moore, *Asst. Supvr.*
Prescott (hdqrs., Prescott, Ariz.)—
F. L. W. Grubb, *Supvr.*
L. J. Putsch, *Asst. Supvr.*
Sitgreaves (hdqrs., Holbrook, Ariz.)—
Paul H. Roberts, B. S. F., *Supvr.*
L. F. Cottam, *Asst. Supvr.*
Robt. C. Salton, B. S., *Asst. For.*
E. L. Hamilton, B. S., *Jr. For.*
Tonto (hdqrs., Phoenix, Ariz.)—
T. T. Swift, Ph. G., M. E., *Supvr.*
J. H. Sizer, *Asst. Supvr.*
Tusayan (hdqrs., Williams, Ariz.)—
G. W. Kimball, A. B., M. F., *Supvr.*
William T. Doherty, F. E., *Asst. Supvr.*
R. D. Norris, B. S. F., *Asst. Range Exam.*
Hugo L. Sundling, B. S., *Jr. For.*

National Forests—Continued.
New Mexico:
Carson (hdqrs., Taos, N. Mex.)—
C. R. Dwire, *Supvr.*
C. A. Merker, B. S. F., *Asst. Supvr.*
Datil (hdqrs., Magdalena, N. Mex.)—
F. L. Kirby, *Supvr.*
B. A. Hendricks, B. S., *Asst. Supvr.*
Gila (hdqrs., Silver City, N. Mex.)—
James A. Scott, *Supvr.*
L. R. Lessel, B. S. F., *Asst. Supvr.*
Lincoln (hdqrs., Alamogordo, N. Mex.)—
O. F. Arthur, *Supvr.*
Simeon Strickland, *Asst. Supvr.*
Manzano (hdqrs., Albuquerque, N. Mex.)—
John A. Adams, M. E., *Supvr.*
Jacob C. Nave, *Asst. Supvr.*
Santa Fe (hdqrs., Santa Fe, N. Mex.)—
Frank E. Andrews, *Supvr.*
M. F. Pincell, *Asst. Supvr.*
H. O. Cassidy, B. S., *Asst. Range Exam.*
C. W. Simmons, B. S. F., M. F., *Jr. For.*
C. H. Kissam, B. F., F. E., *Supt. Road Const.*

DISTRICT 4—Intermountain District

Utah, southern Idaho, western Wyoming, Nevada, and northwestern Arizona (hdqrs., Ogden, Utah).
R. H. Rutledge, *Dist. For.*

Finance and Accounts.
Lee Stratton, *Dist. Fiscal Agt.*
A. C. Wycoff, *Dep. Fiscal Agt.*

Operation.
C. N. Woods, *Asst. Dist. For.*
Thomas V. Pearson, *Admin. Asst.*

State Cooperative Fire Protection under Clarke-McNary Law, Idaho.
C. B. Morse, M. S., *Asst. Dist. For.*

Forest Management.
C. B. Morse, M. S., *Asst. Dist. For.*
L. F. Watts, B. S., *Asst.*
U. S. Swartz, *Log. Engr.*

Range Management.
Ernest Winkler, *Asst. Dist. For.*
J. O. Stewart, *Insp. of Grazing.*
A. R. Standing, *Assoc. Range Exam.*

Lands.
R. E. Gery, *Asst. Dist. For.*
S. B. Locke, B. S., *Tech. Asst.*

Engineering.
J. P. Martin, C. E., *Dist. Engr.*
W. W. Blakeslee, *Asst.*
H. M. Shank, *Assoc. Civil Engr.* (*maps and surveys*).
J. P. Martin, C. E., *Dist. Engr.* (*roads*).
J. P. Martin, C. E., *Dist. Engr.* (*water power*).

Public Relations.
Dana Parkinson, A. B., M. F., *Asst. Dist. For.*

National Forests.
Arizona:
Kaibab (hdqrs., Kanab, Utah)—
Walter G. Mann, *Supvr.*
Idaho:
Boise (hdqrs., Boise, Idaho)—
Guy B. Mains, *Supvr.*
Arthur Potter, *Asst. Supvr.*
Nathan C. Schulze, *Tech. Asst.*
J. W. Stokes, *Tech. Asst.*
Caribou (hdqrs., Montpelier, Idaho)—
Earl C. Sanford, B. S., *Supvr.*
T. Dean Phinney, *Tech. Asst.*
Challis (hdqrs., Challis, Idaho)—
E. A. Renner, *Supvr.*
Idaho (hdqrs., McCall, Idaho)—
S. C. Scribner, *Supvr.*
A. A. Casner, *Asst. Supvr.*
T. W. Farrell, *Asst. Supvr.*
Lemhi (hdqrs., Mackay, Idaho)—
Oscar Mink, *Supvr.*
Minidoka (hdqrs., Burley, Idaho)—
S. S. Stewart, *Supvr.*
Payette (hdqrs., Emmett, Idaho)—
W. B. Rice, B. A., M. F., *Supvr.*
F. S. Moore, *Asst. Supvr.*
Francis Wallis, *Asst. Supvr.*
Clark Miles, *Tech. Asst.*
Thos. W. McKinley, *Tech. Asst.*
Salmon (hdqrs., Salmon, Idaho)—
John N. Kinney, *Supvr.*
Hubert B. Knipe, *Exec. Asst.*
Sawtooth (hdqrs., Hailey, Idaho)—
M. S. Benedict, *Supvr.*
Targhee (hdqrs., St. Anthony, Idaho)—
S. W. Stoddard, *Supvr.*
David A. Arrivee, B. S., *Asst. Supvr.*
Weiser (hdqrs., Weiser, Idaho)—
John Raphael, *Supvr.*
Felix C. Koziol, B. S., *Asst. Supvr.*
Bert R. Lexen, *Tech. Asst.*
Nevada:
Humboldt (hdqrs., Elko, Nev.)—
Alexander McQueen, *Supvr.*
C. E. Brackett, *Asst. Supvr.*
Nevada (hdqrs., Ely, Nev.)—
Chas. A. Beam, *Supvr.*
Tolyabe (hdqrs., Austin, Nev.)
J. W. Gurr, *Supvr.*
Utah:
Ashley (hdqrs., Vernal, Utah)—
A. G. Nord, *Supvr.*
Cache (hdqrs., Logan, Utah)—
Carl B. Arentson, *Supvr.*
Dixie (hdqrs., Cedar City, Utah)—
Orange A. Olsen, *Supvr.*
Fishlake (hdqrs., Richfield, Utah)—
C. A. Mattsson, *Supvr.*
Chester J. Olsen, *Asst. Supvr.*
La Sal (hdqrs., Monb, Utah)
A. C. Folster, *Supvr.*

National Forests—Continued.
Utah—Continued.
Manti (hdqrs., Ephraim, Utah)—
J. W. Humphrey, *Supvr.*
Powell (hdqrs., Panguitch, Utah)—
Wallace M. Riddle, *Supvr.*
Uinta (hdqrs., Provo, Utah)—
Chas. DeMolsy, jr., *Supvr.*
Harley J. Helm, *Asst. Supvr.*
Wasatch (hdqrs., Salt Lake City, Utah)—
E. C. Shepard, B. S., *Supvr.*
T. G. Taylor, *Asst. Supvr.*
Wyoming:
Teton (hdqrs., Jackson, Wyo.)
A. C. McCain, *Supvr.*
Wyoming (hdqrs., Wemmerer, Wyo.)—
C. E. Favre, M. S., *Supvr.*
Milo H. Deming, B. S., *Asst. Supvr.*
Jay B. Hann, *Tech. Asst.*
A. A. Hasel, *Tech. Asst.*
C. H. McDonald, *Jr. Range Exam.*

DISTRICT 5—California District

California and southwestern Nevada (hdqrs., San Francisco, Calif.).
Stuart B. Show, A. B., M. F., *Dist. For.*

Law.
H. P. Dechant, A. B., LL. B., *Asst. to Solicitor.*

Finance and Accounts.
A. W. Smith, *Dist. Fiscal Agt.*
Howard E. Marshall, *Dep. Fiscal, Agt.*

Operation.
Robert L. Deering, A. B., M. F., *Asst. Dist. For.*
Paul P. Pitchlynn, *Dist. For. Insp. (personnel, insp., and improvements).*
E. V. Lackey, *Admin. Asst.*
Jay H. Price, B. S., *Dist. For. Insp.*
E. H. Schmieder, *Chief of Maintenance.*
C. E. Jordan, *Dist. For. Insp.*
W. A. Huestis, *Supt. of Road Const. (minor roads and trails).*
Frank E. Wooldridge, *Chief Surv. (minor roads and trails).*
Don M. Hoffman, *Chief Surv. (minor roads and trails).*
Chas. L. Young, *Chief Surv. (minor roads and trails).*
W. W. Wooldridge, *Foreman of Road Const.*
F. H. Hatley, *Telephone Engr.*

State Cooperative Fire Protection under Clarke-McNary Law, California.
Jay H. Price, B. S., *Dist. For. Insp.*

Forest Management.
T. D. Woodbury, B. Ph., M. F., *Asst. Dist For.*
C. E. Dunston, B. F., *Asst.*
J. R. Berry, *Log. Engr.*
B. O. Hughes, B. S., *Assoc. For. (logging.)*

Forest Management—Continued.
J. C. Elliott, *Lumberman (timber sales).*
O. M. Evans, *For. Exam. (timber surveys).*

Forest Pathology (in coop. with Bur. of Pl. Ind.).
E. P. Meinecke, Ph. D., *Consult. Path.*
Willis W. Wagener, A. B., *Asst.*

Forest Insect Investigations (Palo Alto, Calif.).
H. E. Burke, Ph. D., *Ent.*
J. M. Miller, *Ent.*

Range Management.
Jesse W. Nelson, *Asst. Dist. For.*
Fred P. Cronemiller, B. S., *Asst.*

Lands.
L. A. Barrett, *Asst. Dist. For.*
George Miller, *Dist. For. Insp.*
W. H. Friedhoff, E. M., *Dist. For. Insp.*

Forest Products.
C. L. Hill, A. B., M. S. F., *For., in charge.*
M. R. Brundage, B. S., *Asst.*

Engineering.
F. E. Bonner, *Dist. Engr.*
E. W. Kramer, C. E., *Hydro-electrical Engr. (water power).*
S. H. Ketcham, E. M., *Assoc. Hydro-electrical Engr. (water power).*
H. A. Sedelmeyer, *Chief Draftsman.*
T. R. Littlefield, *Chief Surv. (maps and surveys).*
B. B. Burnett, *Asst. Engr. (roads).*
J. H. Lawrence, *Surv.-Draftsman (bridges).*

Public Relations.
W. I. Hutchinson, A. B., M. F., *Asst. Dist. For.*
Paul J. Fair, *Admin. Off., in charge of exhibits.*

National Forests.
California:
Angeles (hdqrs., Los Angeles, Calif.)—
George H. Cecil, *Supvr.*
Lewis H. Anderson, *Asst. Supvr.*
California (hdqrs., Willows., Calif.)—
J. D. Coffman, M. F., *Supvr.*
W. F. Derby, A. B., *Asst. Supvr.*
Cleveland (hdqrs., San Diego, Calif.)—
J. E. Elliot, *Supvr.*
Eldorado (hdqrs., Placerville, Calif.)—
E. F. Smith, *Supvr.*
Russell S. Bacon, B. S., M. S. F., *Tech. Asst.*
Inyo (hdqrs., Bishop, Calif.)—
Roy Boothe, *Supvr.*
Klamath (hdqrs., Yreka, Calif.)—
F. D. Douthitt, *Supvr.*
Perry J. Hill, *Asst. Supvr.*
John S. Edwards, B. S., *Jr. For.*
Lassen (hdqrs., Susanville, Calif.)—
W. G. Durbin, *Supvr.*
Geo. M. Gowan, B. S., *Asst. Supvr.*
Marc W. Edmonds, B. S., *Jr. For.*
Russell W. Beeson, B. A., *Asst. Range Exam.*

National Forests—Continued.
California—Continued.
Modoc (hdqrs., Alturas, Calif.)—
George W. Lyons, M. S., *Supvr.*
Robert M. Riley, B. S., *Jr. For.*
Plumas (hdqrs., Quincy, Calif.)—
D. N. Rogers, B. S., M. F., *Supvr.*
John T. Gray, *Asst. Supvr.*
Robert W. Ayres, Ph. B., M. F., *Assoc. For.*
Harry E. Dobbins, B. S., *Jr. For.*
Paul R. Kevin, B. S., *Jr. For.*
San Bernardino (hdqrs., San Bernardino, Calif.)—
S. A. Nash-Boulden, *Supvr.*
Fred J. Jeken, *Asst. Supvr.*
Santa Barbara (hdqrs., Santa Barbara, Calif.)—
Wm. V. Mendenhall, *Supvr.*
Frank A. Robinson, *Asst. Supvr.*
Sequoia (hdqrs., Porterville, Calif.)—
F. P. Cunningham, *Supvr.*
T. C. West, *Asst. Supvr.*
Cyril S. Robinson, *Jr. Range Exam.*
Shasta (hdqrs., Mt. Shasta, Calif.)—
Thos. J. Jones, *Supvr.*
Belknap G. Goldsmith, B. S., M. F., *Log. Engr.*
Earl E. Bachman, B. S., *Jr. For.*
Sierra (hdqrs., Northfork, Calif.)—
M. A. Benedict, B. S., *Supvr.*
Walter E. Jotter, B. S., *Asst. For.*
Orville P. Burnett, B. S., *Jr. For.*
Stanislaus (hdqrs., Sonora, Calif.)—
J. R. Hall, B. S., M. S., *Supvr.*
Claude K. Barker, *Asst. Supvr.*
John S. Everitt, B. S., M. F., *Asst. For.*
Guerdon Ellis, B. S., *Jr. For.*
Tahoe (hdqrs., Nevada City, Calif.)—
R. L. P. Bigelow, *Supvr.*
Leland S. Smith, *Asst. Range Exam.*
Millard M. Barnum, *Jr. For.*
Fred J. Dooley, *Sr. Lumberman.*
Trinity (hdqrs., Weaverville, Calif.)—
Frank Price, *Supvr.*
De Witt Nelson, B. S., *Asst. Supvr.*
Nevada:
Mono (hdqrs., Minden, Nev.)—
Wm. M. Maule, *Supvr.*

DISTRICT 6—North Pacific District

Washington and Oregon (hdqrs., Portland, Oreg.).
C. M. Granger, B. S., *Dist. For.*

Finance and Accounts.
A. H. Cousins, *Dist. Fiscal Agt.*
H. J. Well, *Dep. Fiscal Agt.*

Operation.
A. O. Waha, *Asst. Dist. For.*
Shirley Buck, *Admin. Off.*
K. P. Cecil, *Insp. (improvements).*
T. P. Flynn, *Asst. Insp.*
C. M. Allen, *Telephone Engr.*
F. H. Brundage, Ph. B., M. F., *Asst. Dist. For. (fire control).*

Operation—Continued.
W. B. Osborne, jr., A. B., M. F., *Insp. (fire suppression).*
T. M. Talbott, *Asst. Insp. (law enforcement).*

Inspection and Protection of Oregon and California Railroad Lands.
E. H. MacDaniels, A. B., M. F., *Insp. (fire coop.).*

State Cooperative Fire Protection under Clarke-McNary Law, Washington and Oregon.
E. H. MacDaniels, A. B., M. F., *Insp. (fire coop.).*

Forest Management.
Fred Ames, A. B., M. F., *Asst. Dist. For.*
W. F. Ramsdell, B. S., M. S. F., *Admin. Asst.*
Bruce E. Hoffman, B. S., *Log. Engr.*
Geo. L. Drake, B. S. F., *Lumberman.*
O. F. Ericson, A. B., M. S. F., *Assoc. Log. Engr.*
G. E. Stevenson, *Chief Lumberman (check scaling).*
Fred A. Matz, *Chief Lumberman (timber surveys).*

Planting and Forest Investigations.
J. F. Kummel, M. A., *For. Exam. (planting).*
E. J. Hanzlik, B. S. F., *For. Exam. (investigation).*

Forest Pathology (in coop. with Bur. of Pl. Ind.).
John S. Boyce, B. S., M. F., Ph. D., *Consult. Path.*
H. G. Lachmund, A. B., *Asst.*

Forest Insect Control.
A. J. Jacnicke, B. S. F., *For. Exam.*

Range Management.
E. N. Kavanagh, *Asst. Dist. For.*
D. C. Ingram, *Assoc. Range Exam. (range inv.).*

Lands.
C. J. Buck, B. A., M. F., *Asst. Dist. For.*
F. W. Cleator, *Asst. Insp. (recreation).*
W. M. H. Woodward, A. M., *Mineral Exam.*
Ryle Teed, *Asst. Insp. (land exchanges).*
Adolph Nilsson, B. S., *Chief Land Exam.*

Engineering.
Phillip H. Dater, A. B., B. S., *Dist. Engr.*
J. Frankland, C. E., *Assoc. Engr. (maps and surveys).*
Lage Wernstedt, M. E., M. F., *Chief Surv. (maps).*
Victor Flach, *Chief Draftsman.*

Products.
W. H. Gibbons, *For. Exam., in charge.*
Allen H. Hodgson, M. F., *For. Exam.*
H. M. Johnson, B. S., M. S. F., *For. Exam.*

Public Relations.
John D. Guthrie, Ph. B., M. F., *Asst. Dist. For.*

Public Relations—Continued.
Geo. E. Griffith, *Admin. Asst.*
E. M. Stone, *Libr.*

National Forests.
Oregon :
Cascade (hdqrs., Eugene, Oreg.)—
N. F. Macduff, B. S. F., *Supvr.*
R. F. Grefe, B. S. F., *Supt. of Const.*
H. E. Haefner, B. S. A., *Tech. Asst.*
Crater (hdqrs., Medford, Oreg.)—
H. B. Rankin, *Supvr.*
Lee P. Brown, B. S. F., *Jr. For.*
W. J. Sproat, M. F., *Tech. Asst.*
Deschutes (hdqrs., Bend., Oreg.)—
R. L. Fromme, B. S. A., M. F., *Supvr.*
E. J. Schlatter, B. S. F., *Jr. For.*
Leslie Colvill, B. S. F., *Jr. For.*
W. O. Harriman, A. B., *Asst. Supvr.*
W. J. Perry, *Lumberman.*
Fremont (hdqrs., Lakeview, Oreg.)—
Gilbert D. Brown, *Supvr.*
Lawrence Frizzell, *Asst. Supvr.*
R. W. Putnam, B. S., *Jr. For.*
Malheur (hdqrs., John Day, Oreg.)—
Walt L. Dutton, B. S., *Supvr.*
Carl Ewing, *Asst. Supvr.*
R. B. Pierpont, *Supt. of Const.*
Mount Hood (hdqrs., Portland, Oreg.)—
Thomas H. Sherrard, A. B., *Supvr.*
R. T. Carter, *Asst. Supvr.*
H. D. Foster, A. B., M. F., *Tech. Asst.*
Ochoco (hdqrs., Prineville, Oreg.)—
V. V. Harpham, *Supvr.*
W. A. Donnelly, *Asst. Supvr.*
Santiam (hdqrs., Albany, Oreg.)—
C. C. Hall, *Supvr.*
H. G. White, *Asst. Supvr.*
Siskiyou (hdqrs., Grants Pass, Oreg.)—
J. H. Billingslea, B. S. F., *Supvr.*
A. G. Jackson, A. B., M. S. F., *Tech. Asst.*
M. M. Lewis, *Asst. Supvr.*
Siuslaw (hdqrs., Eugene, Oreg.)—
Ralph S. Shelley, B. S., *Supvr.*
A. R. Wilcox, B. S., *Tech. Asst.*
Umatilla (hdqrs., Pendleton, Oreg.)—
J. F. Irwin, *Supvr.*
F. B. Myers, B. S., M. F., *Asst. Supvr.*
J. M. Mann, *Supt. of Const.*
Umpqua (hdqrs., Roseburg, Oreg.)—
Carl B. Neal, A. B., M. F., *Supvr.*
George A. Bonebrake, *Asst. Supvr.*
Donald N. Matthews, B. S. F., M. F., *Jr. For.*
Wallowa (hdqrs., Wallowa, Oreg.)—
Nelson J. Billings, *Supvr.*
D. A. Christianson, *Jr. For.*
Whitman (hdqrs., Baker, Oreg.)—
John C. Kuhns, *Supvr.*
F. W. Furst, B. S., *Asst. Supvr.*
I. E. Jones, *Supt. of Const.*
J. L. Peterson, B. S. H., *Assoc. Range Exam.*
F. D. Monroe, B. S., *Jr. For.*
M. R. Harris, B. S., *Jr. Range Exam.*

National Forests— Continued.
Washington:
Chelan (hdqrs., Okanogan, Wash.)—
P. T. Harris, A. B., M. F., *Supvr.*
G. E. Mitchell, *Asst. Supvr.*
Roy Mitchell, *Supt. of Const.*
Columbia (hdqrs., Portland, Oreg.)—
F. V. Horton, *Supvr.*
R. A. Bottcher, *Supt. of Const.*
H. H. White, *Asst. Supvr.*
G. A. Bright, B. A., M. F., *Tech. Asst.*
Colville (hdqrs., Republic, Wash.)—
P. A. Thompson, *Supvr.*
Lloyd L. Houghland, *Supt. of Const.*
T. H. Burgess, B. S., *Jr. For.*
Mount Baker (hdqrs., Bellingham, Wash.)—
Lawrence B. Pagter, B. A., M. F., *Supvr.*
D. J. Stoner, B. S. F., *Jr. For.*
Olympic (hdqrs., Olympia, Wash.)—
H. L. Plumb, A. B., M. S. F., *Supvr.*
J. R. Bruckart, *Asst. Supvr.*
Robert S. Maclay, B. S., *Jr. For.*
Rainier (hdqrs., Tacoma, Wash.)—
E. J. Fenby, *Supvr.*
J. L. Campbell, *Asst. Supvr.*
E. R. Johnson, *Supt. of Const.*
Lester Monerief, B. S. F., *Jr. For.*
Snoqualmie (hdqrs., Seattle, Wash.)—
W. G. Weigle, M. F., *Supvr.*
Lewis A. Treen, jr., B. S. F., *Asst. Supvr.*
Ira J. Mason, B. S., M. F., *Jr. For.*
Wenatchee (hdqrs., Wenatchee, Wash.)—
A. H. Sylvester, B. S., *Supvr.*
C. J. Conover, B. S., M. S. F., *Tech. Asst.*
F. G. Renner, B. S. F., *Jr. Range Exam.*

DISTRICT 7—Eastern District

Alabama, Arkansas, Florida, Georgia, Kentucky, Maine, Maryland, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Porto Rico, South Carolina, Tennessee, Virginia, West Virginia, and eastern Oklahoma (hdqrs., Washington, D. C.).
Evan W. Kelley, *Dist. For.*

Finance and Accounts.
Louis King, *Dist. Fiscal Agt.*

Operation.
H. O. Stabler, M. F., *Asst. Dist. For.*

Forest Management.
R. M. Evans, B. A., M. F., *Asst. Dist. For.*

Range Management.
Clinton G. Smith, B. S., M. F., *Asst. Dist. For.*

Lands.
Clinton G. Smith, B. S., M. F., *Asst. Dist. For.*
W. W. Ashe, M. S., *For.; Secy., Nat. For. Reserv. Comm.*
Percy J. Paxton, *Dist. For. Insp.*

Engineering.
J. C. Dort, B. S., *Dist. Engr.*
Rezin E. Pidgeon, *Asst. Dist. Engr.*
Geo. W. Root, *Admin. Asst.*

Public Relations.
James E. Scott, *Asst. Dist. For.*
E. Murray Brunner, M. A., M. S., *Dist. For Insp.*
A. M. Kent, B. F., *For. Fires Prevention Lecturer.*

National Forests.
Alabama:
Alabama (hdqrs., Columbus, Ga.)—
H. Norton Cope, *Supvr.*
E. B. Stone, *Jr. Asst. For.*
Arkansas:
Lee (hdqrs., Washington, D. C.)—
Lawrence S. Gross, *Jr. For.*
Ouachita (hdqrs., Hot Springs Nat. Park, Ark.)—
Chas. A. Plymale, *Supvr.*
R. M. Conarro, *Asst. Supvr.*
H. L. Russell, A. B., M. F., *Asst. For.*
A. J. Strelnz, B. S., *Asst. For.*
Philip H. Bryan, *Jr. For.*
Ozark (hdqrs., Russellville, Ark.)—
Henry R. Koen, *Supvr.*
Ben F. Vaughn, *Asst. Supvr.*
James S. Long, *Jr. For.*
Florida:
Florida (hdqrs., Pensacola, Fla.)—
A. C. Shaw, B. S., *Supvr.*
E. W. Gemmer, *Jr. For.*
New Hampshire:
White Mountain (hdqrs., Laconia, N. H.)—
Ira T. Yarnell, B. S., *Supvr.*
C. L. Graham, *Asst. Supvr.*
H. R. Currier, *Asst. Supvr.*
G. S. Wheeler, B. S., M. F., *Jr. For.*
North Carolina:
Nantahala (hdqrs., Franklin, N. C.)—
Robt. W. Shields, B. F., *Supvr.*
John B. Byrne, *Jr. For.*
Pisgah (hdqrs., Asheville, N. C.)—
M. A. Mattoon, *Supvr.*
John W. McNair, *Asst. Supvr.*
Pennsylvania:
Allegheny (hdqrs., Warren, Pa.)—
L. L. Bishop, B. S., *Supvr.*
L. S. Gross, *Asst. For.*
Wm. F. Park, *Jr. For.*
W. I. Stevens, *Jr. For.*
Arthur A. Riemer, *Chief Land Exam.*
Porto Rico:
Luquillo (hdqrs., Rio Piedras, P. R.)—
Wm. P. Kramer, B. F., *Jr. For.*

National Forests—Continued.
Tennessee:
Cherokee (hdqrs., Knoxville, Tenn.)—
R. H. Charlton, *Supvr.*
John Wasilik, jr., M. F., Ph.B., *Asst. Supvr.*
James Denman, *Chief Land Exam.*
Fred C. Henneberger, *Jr. For.*
Lewis R. Smith, *Jr. For.*
Unaka (hdqrs., Bristol, Tenn.)—
Sam R. Broadbent, *Supvr.*
Alfred R. Kinney, *Chief Land Exam.*
C. E. Beaumont, *Asst. For.*
Virginia:
Natural Bridge (hdqrs., Lynchburg, Va.)—
H. M. Sears, *Supvr.*
Harry True, *Chief Land Exam.*
David W. Tabbutt, *Jr. For.*
E. V. Roberts, *Jr. For.*
Shenandoah (hdqrs., Harrisonburg, Va.)—
S. H. Marsh, A. B., M. F., *Supvr.*
A. A. Wood, *Asst. Supvr.*
E. R. Conrad, *Chief Land Exam.*
West Virginia:
Monongahela (hdqrs., Elkins, W. Va.)—
C. L. Perkins, B. S., *Supvr.*

DISTRICT 8—Alaska District

Alaska (hdqrs., Juneau).
Chas. H. Flory, B. S., *Dist. For.*

Finance and Accounts.
H. L. Rellingshafer, *Dist. Fiscal Agt.*

Operation.
M. L. Merritt, M. S., *Asst. Dist. For.*
Harry Sperling, *Chief of Maintenance.*

Forest Management.
B. F. Heintzleman, M. F., *Asst. Dist. For.*
J. P. Williams, *For. Exam. (timber surveys).*

Lands.
M. L. Merritt, M. S., *Asst. Dist. For.*
Wellman Holbrook, *For. Exam.*

Engineering.
M. L. Merritt, M. S., *Asst. Dist. For. (roads).*
B. F. Heintzleman, M. F., *Asst. Dist. For. (water power).*

National Forests.
Alaska:
Chugach (hdqrs., Cordova, Alaska)—
W. J. McDonald, *Supvr.*
J. A. Thayer, B. S., *Jr. For.*
L. C. Pratt, *Exec. Asst.*
Tongass (hdqrs., Ketchikan, Alaska)—
Robert A. Zeller, B. S., *Supvr.*
J. M. Walley, B. S., *For. Exam.*
C. W. Griffin, *Exec. Asst.*
L. W. Blodgett, *Sr. Engr.*
Bernard R. Aikens, *Sr. Engr.*
E. F. Thompson, *Jr. Engr.*

BUREAU OF CHEMISTRY AND SOILS

H. G. Knight, Ph. D., *Chief.*
C. A. Browne, Ph. D., *Assistant Chief.*
A. G. Rice, *Asst. to Chief.*
W. W. Weir, Ph. D., *Assoc. Soil Technol., in charge of Ed. Work.*
C. A. Wolfe, *in charge of Finance and Acct.*
H. A. Donovan, *Chief Clerk and Personnel Off.*
J. W. Stevens, *in charge of Supplies and Equipment.*

CHEMICAL AND TECHNOLOGICAL RESEARCH

C. A. Browne, Ph. D., *Chief.*
W. W. Skinner, Sc. D., *Asst. Chief.*

CARBOHYDRATE DIVISION

H. S. Paine, B. S., *Sr. Chem., in charge.*

Cane Sugar.
R. T. Balch, A. M., *Chem.*
M. A. McCallp, M. S., *Asst. Chem.*

Beet Sugar and Colloids.
L. E. Dawson, B. S., *Assoc. Chem.*
V. Birckner, Ph. D., *Asst. Chem.*
M. S. Badollet, M. S., *Asst. Chem.*
J. C. Keane, A. B., *Asst. Chem.*

Sirups, Sugars, and Honey.
R. T. Balch, A. M., *Chem.*
M. A. McCallp, M. S., *Asst. Chem.*
V. Birckner, Ph. D., *Asst. Chem.*

Starches.
J. A. Ambler, Ph. D., *Assoc. Chem.*

Sugar Plant Constituents.
D. H. Brauns, Ph. D., *Assoc. Chem.*
J. Hamilton, *Sci. Aid.*

CHEMICAL ENGINEERING DIVISION

D. J. Price, B. S., E. M., *Engr. in charge.*

Dust Explosions.
H. R. Brown, B. S., M. E., *Asst. Engr.*
P. W. Edwards, B. S., *Asst. Engr.*
R. W. Harrison, B. S., *Jr. Engr.*
R. M. Baker, *Sr. Draftsman.*

Farm Fires.
H. E. Roethe, B. S., *Assoc. Engr.*

Industrial Relations.
W. A. Noel, B. S., M. E., *Asst. Engr.*

Development.
J. D. Reed, B. S., *Asst. Engr.*

COLOR AND FARM WASTE DIVISION

H. T. Herrick, Ch. E., *Chem., in charge.*

Agricultural Waste.
D. F. J. Lynch, A. M., *Assoc. Chem.*
M. J. Goss, A. B., *Asst. Chem.*

Dye Intermediates.
P. H. Groggins, B. S., *Assoc. Chem.*
W. Scholl, Ch. Eng., *Jr. Chem.*

Industrial Wastes.
C. E. Senseman, A. M., *Assoc. Chem.*
H. D. Weihe, *Jr. Chem.*

Biological Stains.
W. C. Holmes, A. B., *Assoc. Chem.*
J. T. Scanlan, B. S., *Asst. Chem.*

Industrial Fermentations.
O. E. May, B. S., *Asst. Chem.*
S. M. Welsberg, B. S., *Jr. Chem.*

Lignin.
M. Phillips, Ph. D., *Chem.*

CROP CHEMISTRY LABORATORY

E. T. Wherry, Ph. D., *Sr. Chem., in charge.*
Jehiel Davidson, Ph. D., *Assoc. Chem.*
Ruth G. Capen, A. B., *Jr. Chem.*

FOOD RESEARCH DIVISION

F. C. Blanck, Ph. D., *Sr. Chem., in charge.*

Fruit and Vegetable Chemistry.
California—Los Angeles:
E. M. Chace, LL. M., *Chem., in charge.*
W. B. Davis, Ph. D., *Assoc. Chem.*
C. G. Church, M. S., *Asst. Chem.*
H. D. Poore, B. S., *Asst. Chem.*
D. G. Sorber, A. B., *Jr. Chem.*
District of Columbia—Washington:
E. K. Nelson, B. S., *Chem.*

Food Microscopy.
B. J. Howard, B. S., *Sr. Micros., in charge.*
L. H. James, B. S., *Assoc. Bact.*
V. A. Pease, Ph. D., *Asst. Microan.*
E. Le Fevre, M. D., *Asst. Bact.*
M. B. Church, Ph. D., *Asst. Mycol.*

Metals in Foods.
G. C. Spencer, Ph. D., *Assoc. Chem.*
L. J. Jenkins, *Asst. Sci. Aid.*

INSECTICIDE DIVISION

R. C. Roark, Ph. D., *Assoc. Chem., acting in charge.*
F. B. La Forge, Ph. D., *Assoc. Chem.*
O. A. Nelson, M. S., *Assoc. Chem.*
C. R. Smith, B. S., *Assoc. Chem.*
H. D. Young, B. S., *Asst. Chem.*
J. W. Barnes, M. S., *Asst. Chem.*
W. A. Gersdorff, M. S., *Asst. Chem.*

OIL, FAT, AND WAX LABORATORY

G. S. Jamieson, Ph. D., *Chem., in charge.*
W. F. Baughman, B. S., *Assoc. Chem.*
R. M. Hann, B. S., *Asst. Chem.*

PROTEIN AND NUTRITION DIVISION

D. B. Jones, Ph. D., *Sr. Chem., in charge.*
F. A. Csonka, Ph. D., *Assoc. Chem.*
E. M. Nelson, Ph. D., *Assoc. Chem.*
J. G. Wangler, M. S., *Jr. Chem.*
R. Wilson, B. S., *Jr. Chem.*
C. E. F. Gersdorff, *Asst. Sci. Aid.*
J. P. Divine, *Asst. Sci. Aid.*

TECHNOCHEMICAL DIVISION

F. P. Veitch, Sc. D., *Sr. Chem., in charge.*

Farm Fabrics.
H. P. Holman, A. B., *Chem.*
T. D' Jarrell, M. S., *Asst. Chem.*

Leather and Tanning Materials.
R. W. Frey, B. S., *Assoc, Chem.*
I. D. Clarke, A. B., *Asst. Chem.*
L. R. Lehnbach, B. S., *Jr. Chem.*
W. D. Edington, A. B., *Jr. Chem.*

Naval Stores.
H. P. Holman, A. B., *Chem.*
G. P. Shingler, B. S., *Assoc. Chem.*
W. C. Smith, A. B., *Jr. Chem.*

Paper.
T. D. Jarrell, M. S., *Asst. Chem.*

SOIL INVESTIGATIONS

A. G. McCall, B. S., Ph. D., *Chief.*
Milton Whitney, D. A., *Sci. in Spec. Soil Studies.*

SOIL PHYSICS

Physical Soil Characteristics.
L. B. Olmstead, B. S., A. M., *Assoc. Phys.*
H. E. Middleton, M. S., *Asst. Phys.*

Mechanical Soil Analysis.
J. B. Spencer, *Asst. Sci. Aid, in charge.*
V. J. Jacquot, jr., *Under Sci. Helper.*
R. W. Mahorney, *Under Sci. Helper.*

SOIL CHEMISTRY

Philip L. Gile, A. B., *Chem., in charge.*

Research in Soil Chemistry.
M. S. Anderson, A. B., M. S., Ph. D., *Assoc. Chem.*
Irving A. Denison, M. S., *Asst. Chem.*
Robert S. Holmes, A. B., *Asst. Chem.*
W. O. Robinson, M. S., *Assoc. Chem.*
J. G. Smith, M. S., *Asst. Chem.*

Soil Mineralogy and Petrography.
W. H. Fry, A. B., *Assoc. Soil Petrographer.*

Soil Analysis.
Glen Edgington, B. S., *Asst. Chem.*
G. J. Hough, B. S., *Asst. Chem.*

SOIL SURVEY

Curtis F. Marbut, Ph. D., LL. D., *Sr. Soil Sci., in charge.*
George W. Baumann, *Exec. Asst.*
Mark Baldwin, B. S., *Insp., Dist. 1.*
W. E. Hearn, B. S., *Insp., Dist. 2.*
T. D. Rice, Ph. B., *Insp., Dist. 3.*
H. H. Bennett, B. S., *Insp., Dist. 4.*
M. H. Lapham, B. S., *Insp., Dist. 5.*
J. E. Lapham, *Assoc. Soil Technol.*
W. J. Geib, *Sci. in Soil Surv.*
C. C. Bassett, *Assoc. Cartographer.*

E. M. Eastword, *Assoc. Cartographer.*
W. T. Carter, jr., B. S., *Assoc. Soil Sci.*
A. T. Strahorn, B. S., *Assoc. Soil Sci.*
A. T. Sweet, B. S., *Assoc. Soil Sci.*
A. C. Anderson, B. S., *Asst. Soil Surv.*
M. W. Beck, B. S., *Asst. Soil Surv.*
E. J. Carpenter, B. S., *Asst. Soil Surv.*
E. B. Deeter, B. S., *Asst. Soil Surv.*
E. D. Fowler, B. S., *Asst. Soil Surv.*
F. A. Hayes, B. S., A. M., *Asst. Soil Surv.*
B. H. Hendrickson, B. S., *Asst. Soil Surv.*
R. C. Jurney, A. B., *Asst. Soil Surv.*
J. A. Kerr, A. B., B. S., *Asst. Soil Surv.*
E. W. Knobel, B. S., *Asst. Soil Surv.*
W. J. Latimer, B. S., *Asst. Soil Surv.*
C. Lounsbury, B. S., *Asst. Soil Surv.*
S. O. Perkins, B. S., *Asst. Soil Surv.*
S. W. Phillips, M. S., *Asst. Soil Surv.*
A. E. Taylor, Ph. B., *Asst. Soil Surv.*
W. E. Tharp, *Asst. Soil Surv.*
W. I. Watkins, B. S., *Asst. Soil Surv.*
R. Wildermuth, B. S., *Asst. Soil Surv.*
L. A. Wolfanger, B. S., *Asst. Soil Surv.*
E. H. Bailey, M. S., *Jr. Soil Surv.*
R. E. Devereux, A. B., *Jr. Soil Surv.*
M. J. Edwards, *Jr. Soil Surv.*
T. W. Glassey, *Jr. Soil Surv.*
A. W. Goke, B. S., *Jr. Soil Surv.*
A. L. Gray, B. S., *Jr. Soil Surv.*
W. G. Harper, B. S., *Jr. Soil Surv.*
M. H. Layton, B. S., *Jr. Soil Surv.*
W. D. Lee, B. S., *Jr. Soil Surv.*
F. R. Lesh, *Jr. Soil Surv.*
A. H. Hasty, *Jr. Soil Surv.*
J. W. Moon, B. S., *Jr. Soil Surv.*
W. J. Moran, B. S., *Jr. Soil Surv.*
C. S. Simmons, *Jr. Soil Surv.*
H. M. Smith, B. S., *Jr. Soil Surv.*
James Thorp, B. S., *Jr. Soil Surv.*
B. H. Williams, B. S., *Jr. Soil Surv.*
F. O. Youngs, B. S., *Jr. Soil Survey.*
C. B. Boatright, B. S., *Asst. Sci. Aid.*
W. C. Boatright, B. S., *Asst. Sci. Aid.*
E. G. Fitzpatrick, *Asst. Sci. Aid.*
Z. C. Foster, B. S., *Asst. Sci. Aid.*
E. N. Poulson, *Asst. Sci. Aid.*
Ray C. Roberts, B. S., *Asst. Sci. Aid.*
G. A. Swenson, *Asst. Sci. Aid.*
J. H. Zentmire, *Asst. Sci. Aid.*

Soil Microbiology

Charles Thom, Ph. D., *Sr. Mycol., in charge.*

Soil Bacteriology Investigations.
Nathan R. Smith, B. S., *Assoc. Bact.*
Klare S. Markley, M. S., *Asst. Biochem.*
Daniel Ready, *Sci. Aid.*

Peat Investigations.
Alfred P. Dachnowski Stokes, A. M., Ph. D., *Assoc. Physiol.*

Legume Bacteria.
Lewis T. Leonard, B. S., M. A., *Assoc. Physiol.*
Franklin W. Marsh, B. S., *Jr. Bact.*
Samuel H. Newcomer, *Sci. Helper.*

Soil Fertility

Oswald Schreiner, M. S., Ph. D., *Sr. Biochem., in charge.*

Soil and Fertilizer Investigations.
Bailey E. Brown, M. S., *Biochem.*
Joshua J. Skinner, M. S., Ph. D., *Biochem.*
Lewis A. Hurst, B. S., *Assoc. Biochem.*

Biochemical Investigations of Soils.
Edmund C. Shorey, A. M., D. Sc., *Biochem.*
Paul R. Dawson, M. A., *Asst. Biochem.*

Biochemical Investigations of Fertilizers.
Ralph B. Deemer, B. S., *Asst. Biochem.*
Wilbur R. Leighty, M. S., *Asst. Biochem.*

Biochemical Investigations of Crop Plants.
Frank M. Schertz, M. A., Ph D., *Assoc. Biochem.*

Soil-Reaction Studies.
Edward F. Snyder, B. S., *Asst. Biochem.*

Greenhouse Work.
Fred R. Reid, *Asst. Biochem.*

FERTILIZER AND FIXED NITROGEN INVESTIGATIONS

F. G. Cottrell, B. S., Ph. D., *Chief.*
O. L. Helsley, *Exec. Asst.*

Mechanism of Catalysis.
P. H. Emmett, Ph. D., *Assoc. Chem.*
J. Y. Yee, M. S., *Asst. Chem.*
E. H. Johnston, *Jr. Chem.*

Hydrogen Production and Purification.
E. C. White, Ph. D., *Assoc. Chem.*
W. E. Kuentzel, M. S., *Asst. Chem. Engr.*
J. F. Shultz, B. S., *Jr. Chem.*
C. A. Black, M. S., *Jr. Chem. Engr.*

Transformation of Nitrogen Compounds.
R. O. E. Davis, Ph. D., *Chem.*
H. J. Krase, M. S., *Assoc. Chem. Engr.*
V. N. Morris, Ph. D., *Asst. Chem.*
V. L. Gaddy, *Jr. Chem.*
H. C. Hetherington, A. M., *Assoc. Chem.*
K. G. Clark, B. S., *Asst. Chem. Engr.*
Mildred S. Sherman,* M. S., *Jr. Chem.*
Katharine S. Love, A. B., *Jr. Chem.*
Joseph Reuter, *Instrument Maker.*

Engineering Research and Development.
F. A. Ernst, C. E., *Sr. Chem. Engr.*
J. G. Thompson, Ph. D., *Assoc. Chem.*
W. L. Edwards, C. E., *Assoc. Engr.*
J. R. Dilley, M. E., *Assoc. Mech. Engr.*
Constance Sherry,* *Draftsman.*
C. M. Sullivan, B. S., *Asst. Chem. Engr.*
H. Bryan, *Assoc. Mech. Engr.*
J. F. Mullins, *Prin. Mech.*

Physical Investigations.
E. P. Bartlett, Ph. D., *Assoc. Chem.*
H. L. Cupples, Ph. D., *Asst. Chem.*
T. H. Tremearne, *Asst. Sci. Aid.*
A. N. Illinski, B. S., *Asst. Chem.*
C. H. Kunsman, Ph. D., *Phys.*
R. A. Nelson, *Sci. Aid.*

Physical Investigations—Continued.
E. S. Lamar, *Jr. Phys.*
L. Testa, *Glassblower.*

Biochemical and Organic Nitrogen Investigations.
F. E. Allison, Ph. D., *Chem.*
C. D. Garby, Ph. D., *Asst. Chem.*
L. A. Pluck, M. S., *Asst. Chem.*
Mary K. Murray,* B. S., *Jr. Chem.*

Phosphates and Potash Investigations.
J. W. Turrentine, M. S., Ph. D., *Chem.*
P. H. Royster, M. A., *Assoc. Chem. Engr.*
K. D. Jacob, B. S., *Assoc. Chem.*
E. J. Fox, A. B., *Asst. Chem.*
D. S. Reynolds, B. S., *Jr. Chem.*

Concentrated Fertilizer.
W. H. Ross, M. S., Ph. D., *Chem.*
A. R. Merz, M. S., Ph. D., *Assoc. Chem.*
C. W. Whittaker, A. B., M. S., *Asst. Chem.*
A. L. Mehring, A. B., *Asst. Chem.*
J. R. Adams, B. S., *Asst. Chem.*
H. E. Patten, Ph. D., *Asst. Chem.*

Organic Fertilizers and Soil Amendments.
C. C. Fletcher, M. D., *Assoc. Chem.*
G. P. Walton, M. S., *Assoc. Chem.*
J. B. Martin, A. B., M. S., *Asst. Chem.*
Robert F. Gardiner, M. S., *Asst. Chem.*
F. O. Lundstrom, A. B., *Asst. Chem.*

BUREAU OF ENTOMOLOGY

L. O. Howard, M. S., Ph. D., M. D., LL. D., Sc. D., *Chief.*
C. L. Marlatt, M. S., Sc. D., *Assoc. Chief, in charge of regulatory work.*
A. L. Quaintance, M. S., D. Sc., *Assoc. Chief, in charge of research.*

BUSINESS ADMINISTRATION, INFORMATION, AND LIBRARY

S. A. Rohwer, *Sr. Ent., in charge.*
E. B. O'Leary, *Admin. Off.*

Business Administration.
A. J. Leister, *Fiscal Off.*
J. E. Andrews, *Aud.*
H. T. Sinclair, *Acct.*
S. B. Walker, *Purchasing Off.*
M. I. Ely, *Personnel Clerk.*
B. J. Boiseau, *Admin. Clerk.*

Information and Editorial Work.
Rolla P. Currie, B. A., *Assoc. Ent., in charge.*
J. P. Schumacher, A. B., *Asst. Ed.*
A. L. Colton, Ph. B., A. M., *Jr. Ed.*
W. E. McBath, M. A., *Jr. Ed.*
J. C. Pratt, *Photographer.*
W. N. Dovener, *Chief Sci. Illustr.*

Library.
Mabel Colcord, A. B., B. L. S., *Assoc. Libr., in charge.*
Ina L. Hawes, B. S., *Jr. Libr.*
Angelina Carabelli, *Libr. Asst.*

DECIDUOUS-FRUIT INSECTS

A. L. Quaintance, M. S., D. Sc., *Assoc. Chief of Bureau, in charge.*
Eva Baldwin Fitzgerald,* B. A., *Sci. Illustr.*
Abby Holdridge, *Jr. Sci. Aid.*

Orchard Insecticides.
C. H. Richardson, M. S., Ph. D., *Ent.*
Carlo Zelmet, *Asst. Bibl. Ent.*
F. L. Campbell, M. S., D. Sc., *Assoc. Ent.*

Orchard Insecticides—Continued.
H. H. Shepard, M. S., *Asst. Ent.*
R. S. Filmer, B. S., *Jr. Ent.*

FIELD LABORATORY:
Maryland—Sligo (post office, Silver Spring)
N. E. McIndoo, A. M., Ph. D., *Ent.*

Apple Insects.
P. W. Mason, M. S., Ph. D., *Assoc. Ent. (aphid studies).*

FIELD LABORATORIES:
Arkansas—Bentonville—
A. J. Ackerman, B. S., *Assoc. Ent., in charge.*
H. H. Schwardt, B. S., *Jr. Ent.*
Indiana—Vincennes—
B. A. Porter, B. S., Ph. D., *Assoc. Ent., in charge.*
R. F. Sazama, B. S., *Jr. Ent.*
Kansas—Wichita—
Paul M. Gilmer, A. B., Ph. D., *Assoc. Ent., in charge.*
Howard Baker, B. S., *Jr. Ent.*
Maryland—Sligo (post office, Silver Springs)—
E. H. Siegler, B. S., *Assoc. Ent.*
Luther Brown, B. S., *Asst. Ent.*
New Jersey—Riverton—
L. C. McAlister, jr., B. S., *Jr. Ent.*
Washington—Yakima—
E. J. Newcomer, A. B., *Assoc. Ent., in charge.*
M. A. Yothers, M. S., *Assoc. Ent.*

Grape Insects.
FIELD LABORATORY:
Ohio—Sandusky—
G. A. Runner, *Assoc. Ent., in charge.*

Nut Insects.

FIELD LABORATORIES:

Georgia—Thomasville—

G. F. Moznette, B. S., *Assoc. Ent., in charge.*

C. H. Martin, A. B., *Asst. Ent.*

Texas—Brownwood (branch of Thomasville, Ga., lab.)—

H. S. Adair, B. S., *Jr. Ent.*

C. C. Pinkney, B. S., *Jr. Ent.*

West Virginia—French Creek—

F. E. Brooks, *Assoc. Ent., in charge.*

Peach Insects.

FIELD LABORATORIES:

Georgia—Fort Valley—

O. I. Snapp, B. S., *Assoc. Ent., in charge.*

H. S. Swingle, M. S., *Asst. Ent.*

New Jersey—Riverton—

Alvah Peterson, B. S., M. A., Ph. D., *Ent., in charge of peach moth inv.*

G. J. Haeussler, B. S., *Jr. Ent.*

J. W. Lipp, M. S., *Asst. Ent.*

Orchard Insect Survey.

FIELD LABORATORY:

Maryland—Sligo (post office), Silver Spring)—

R. E. Snodgrass, A. B., *Assoc. Ent., in charge of insect morphology.*

Blueberry Maggot.

FIELD LABORATORY:

Maine—Cherryfield—

F. H. Lathrop, B. S., Ph. D., *Ent., in charge.*

C. B. Nickels, B. S., M. S., *Asst. Ent.*

CEREAL AND FORAGE INSECTS

W. H. Larrimer, M. S., Ph. D., *Sr. Ent., in charge.*

W. R. Walton, *Ent.*

J. S. Wade, *Assoc. Ent.*

Esther H. Hart, A. B., *Prin. Sci. Illustr.*

Nettie S. Klopfer[3], *Under Sci. Helper.*

General Cereal and Forage Insects.

FIELD LABORATORIES:

Arizona—Tempe (clover and alfalfa seed chalcis, corn earworm, alfalfa caterpillar, grasshoppers, and plant-lice)—

V. L. Wildermuth, B. S., *Assoc. Ent., in charge.*

E. E. Russell, *Asst. Ent.*

R. A. Blanchard, A. B., *Asst. Ent.*

E. G. Davis, B. S., *Jr. Ent.*

Francis M. Jones, *Under Sci. Helper.*

California—Sacramento (grasshoppers, Hessian fly, wireworms, and range crickets)—

W. B. Cartwright, B. S., *Assoc. Ent., in charge.*

C. C. Wilson, B. S., *Jr. Ent.*

General Cereal and Forage Insects—Contd.

FIELD LABORATORIES—Continued.

Indiana—West Lafayette (Hessian fly, sod webworms, lesser clover leaf weevil, grasshoppers, and chinch bug)—

C. M. Packard, M. S., *Ent., in charge.*

H. R. Painter, M. S., *Asst. Ent.*

W. B. Noble, B. S., *Asst. Ent.*

Curtis Benton, M. S., *Jr. Ent.*

Iowa—Sioux City (pale western cutworm, chinch bug, Hessian fly, and wheat stem sawfly)—

C. N. Ainslie, M. A., *Asst. Ent., in charge.*

Kansas—Wichita (Hessian fly, chinch bug, green bug, white grubs, and false wireworms)—

J. R. Horton, B. S., *Assoc. Ent., in charge.*

E. T. Jones, A. M., *Asst. Ent.*

J. S. Pinckney, B. S., *Jr. Ent.*

H. H. Walkden, B. S., *Jr. Ent.*

Missouri—Webster Groves (Hessian fly, billbugs, wheat jointworm, strawworms, and chinch bug)—

A. F. Satterthwait, *Assoc. Ent., in charge.*

R. C. Lange, *Asst. Sci. Aid.*

Montana—Billings (grasshoppers and crickets)—

Stewart Lockwood, A. B., *Assoc. Ent., in charge.*

R. L. Shotwell, A. B., *Asst. Ent.*

F. T. Cowen, B. S., *Jr. Ent.*

Oregon—Forest Grove (clover root borer, wireworms, Hessian fly, wheat midge, plant-lice, and grasshoppers)—

L. P. Rockwood, B. S., *Assoc. Ent., in charge.*

T. R. Chamberlin, B. S., *Asst. Ent.*

M. M. Reeher, A. B., *Asst. Ent.*

Sadie E. Keen, A. B., *Jr. Ent.*

Pennsylvania—Carlisle (Hessian fly and its parasites)

C. P. Hill, B. S., *Asst. Ent., in charge.*

H. D. Smith, B. S., *Jr. Ent.*

Texas—San Antonio (sorghum midge, grasshoppers, green bug, and southwestern corn borer)

E. V. Walter, B. S., *Assoc. Ent., in charge.*

F. W. Boyd, B. S., *Asst. Ent.*

Utah—Salt Lake City (alfalfa weevil and its parasites)

G. I. Reeves, A. B., *Ent., in charge.*

I. M. Hawley, Ph. D., *Ent.*

S. J. Snow, A. B., *Asst. Ent.*

General Cereal and Forage Insects—Contd.

FIELD LABORATORIES—Continued.

Virginia—

Charlottesville (wheat jointworm, corn earworm, and larger corn stalk borer)—

W. J. Phillips, Ph. D., *Ent., in charge.*

L. C. Woodruff, A. B., *Jr. Ent.*

John C. Shiver, B. S., *Jr. Ent.*

Richmond (branch of Charlottesville, Va., lab.)—

G. W. Barber, M. S., D. Sc., *Asst. Ent.*

Sugar Cane and Rice Insects.

FIELD LABORATORIES:

Louisiana—

Crowley (under direction of Assoc. Ent. in charge of New Orleans, La., lab.)—

J. W. Ingram, B. S., *Asst. Ent. (rice insects).*

New Orleans—

T. E. Holloway, B. S., *Assoc. Ent., in charge.*

W. E. Haley, *Prin. Sci. Aid.*

European Corn Borer.

FIELD LABORATORIES:

France—Hyères, Var (parasites of corn borer)—

W. R. Thompson, M. S., D. Sc., *Ent., in charge.*

H. L. Parker, B. S., D. Sc., *Assoc. Ent.*

A. M. Vance, B. S., *Asst. Ent.*

Connecticut—Stratford—

R. A. Vickery, A. M., *Asst. Ent., in charge.*

Massachusetts—Arlington—

D. J. Caffrey, B. S., *Ent., in charge of research.*

D. W. Jones, B. S., *Assoc. Ent.*

C. H. Batchelder, M. S., Ph. D., *Assoc. Ent.*

W. A. Baker, B. S., *Asst. Ent.*

B. E. Hodgson, B. S., *Asst. Ent.*

W. G. Bradley, B. S., *Asst. Ent.*

R. A. Biron, B. S., *Jr. Ent.*

C. A. Clark, B. S., *Jr. Ent.*

R. C. Ellis, *Jr. Ent.*

J. C. Silver, B. S., *Jr. Ent.*

F. S. Vidler, *Sr. Mech.*

Michigan—Monroe—

Philip Luginbill, A. M., Ph. D., *Assoc. Ent., in charge.*

F. L. Simonton, A. M., *Assoc. Ent.*

New York—Silver Creek—

H. N. Bartley, B. S., *Asst. Ent., in charge.*

L. B. Scott, B. S., *Jr. Ent.*

Ohio—Sandusky—

L. H. Patch, B. S., *Asst. Ent.*

European Corn Borer—Continued.

FIELD OFFICES:

Massachusetts—Boston (branch of Toledo, Ohio, office)—

R. S. Clifton, *Admin. Asst., in charge.*

C. W. Lewis, B. S., *Prin. Sci. Aid.*

Ohio—

Cleveland (branch of Toledo, Ohio, office)—

E. G. Brewer, *Admin. Off., in charge.*

G. P. Babson, *Sr. Sci. Aid.*

Toledo:

L. H. Worthley, *Admin. in Corn Borer Control.*

C. H. Hadley, B. S., *Sr. Admin. in Insect Control.*

John H. Harman, B. S., *Asst. Ent.*

C. O. Larrabee, *Prin. Sci. Aid.*

J. W. Enwright, *Sr. Sci. Aid.*

F. L. Fall, *Sr. Sci. Aid.*

COTTON INSECTS

(Hdqrs., Tallulah, La.)

B. R. Coad, *Ent., in charge.*

FIELD LABORATORIES:

Arizona—Tucson—

T. P. Cassidy, B. S., *Assoc. Ent., in charge.*

A. J. Chapman, B. S., *Jr. Ent.*

H. C. Young, B. S., *Jr. Ent.*

W. A. Stevenson, B. S., *Jr. Ent.*

William Hackett, *For. Ranger.*

V. V. Williams, B. S., *Jr. Ent.*

Louisiana—Tallulah (hdqrs.)—

B. R. Coad, *Ent., in charge.*

J. W. Folsom, Sc. B., Sc. D., *Assoc. Ent.*

F. H. Tucker, *Assoc. Chem.*

G. A. Maloney, *Asst. Ent.*

W. S. Cook, M. A., *Asst. Sci. (pl. morphology).*

F. F. Bondy, B. S., *Asst. Ent.*

M. T. Young, B. S., *Asst. Ent.*

R. C. Gaines, B. S., *Asst. Ent.*

R. W. Moreland, B. S., *Asst. Ent.*

K. P. Ewing, B. S., *Asst. Ent.*

G. L. Smith, B. S., *Jr. Ent.*

P. A. Glick, A. B., M. S., *Jr. Pl. Quar. Insp.*

G. L. Garrison, *Sr. Sci. Aid.*

Maryland—Sligo (post office, Silver Spring)—

J. L. Webb, M. S., *Assoc. Ent.*

South Carolina—Florence—

E. W. Dunnam, B. S., *Asst. Ent.*

Texas—

Brownsville—

T. C. Barber, B. S., *Asst. Ent., in charge.*

El Paso—

F. A. Fenton, M. A., Ph. D., *Ent.*

FOREST INSECTS

F. C. Craighead, B. A., M. S., Ph. D., *Sr. Ent., in charge.*

Western Bark Beetles.

FIELD LABORATORIES:

California—

Northfork (branch of Palo Alto, Calif., lab.)—

J. M. Miller, B. S., *Ent., in charge.*

Palo Alto—

J. M. Miller, B. S., *Ent., in charge.*
H. E. Burke, M. S., Ph. D., *Ent.*
F. P. Keen, B. S., *Assoc. Ent.*
H. L. Person, M. S., *Asst. Ent.*
Albert Wagner, *Sr. Sci. Aid.*
George Hofer, *Sr. Sci. Aid.*
W. J. Buckhorn, *Sr. Sci. Aid.*

Idaho—Coeur d'Alene—

J. C. Evenden, B. S., *Assoc. Ent., in charge.*
A. L. Gibson, B. S., *Asst. Ent.*
H. J. Rust, *Sr. Sci. Aid.*

Oregon—Ashland (branch of Palo Alto, Calif., lab.)—

J. E. Patterson, *Asst. Ent.*

Forest-Tree Insects.

FIELD LABORATORIES:

Massachusetts—Amherst—

H. J. MacAloney, M. F., B. S., *Asst. Ent., in charge.*

Minnesota—St. Paul—

S. A. Graham, B. S., M. F., Ph. D., *Agt., in charge.*
L. G. Baumhofer, B. S., *Jr. Ent.*

North Carolina—Asheville—

J. A. Beal, B. S., *Asst. Ent., in charge.*

Virginia—East Falls Church—

R. A. St. George, M. S., *Assoc. Ent., in charge.*

Forest-Product Insects.

T. E. Snyder, B. A., M. F., Ph. D., *Ent.*

Shade-Tree Insects.

William Middleton, B. A., *Assoc. Ent.*

TRUCK-CROP INSECTS

J. E. Graf, A. B., *Sr. Ent., in charge.*
W. H. White, B. S., *Assoc. Ent.*
Mary C. Foley, *Asst. Sci. Illustr.*

Taxonomy of Truck-Crop Insects.

F. H. Chittenden, Sc. D., *Ent.*
Doris H. Blake*, A. M., *Jr. Ent.*

Miscellaneous Truck-Crop Insects.

FIELD LABORATORIES:

Louisiana—Baton Rouge—

C. E. Smith, M. S., *Assoc. Ent., in charge.*
Norman Allen, M. S., *Jr. Ent.*

Mississippi—Gulfport—

M. M. High, B. S., *Assoc. Ent., in charge.*

Miscellaneous Truck-Crop Insects—Continued.

FIELD LABORATORIES—Continued.

North Carolina—Chadbourn—

W. A. Thomas, B. S., *Asst. Ent., in charge.*
W. J. Reid, jr., B. S., *Jr. Ent.*

Pennsylvania—Philadelphia—

D. E. Fink, M. S., Ph. D., *Assoc. Ent., in charge.*

Sugar-Beet Insects.

FIELD LABORATORIES:

Idaho—Twin Falls—

Walter Carter, M. S., *Assoc. Ent., in charge.*
H. E. Wallace, M. S., *Jr. Ent.*

Oregon—Corvallis (branch of Twin Falls, Idaho, lab.)—

C. H. Griffith, B. S., *Jr. Ent.*

Utah—Richfield (branch of Twin Falls, Idaho, lab.)—

E. W. Davis, M. S., *Asst. Ent.*

Soil Insects.

FIELD LABORATORIES:

California—Alhambra—

R. E. Campbell, M. S., *Assoc. Ent., in charge.*
J. C. Elmore, B. S., *Jr. Ent.*
A. C. Davis, B. S., *Agt.*

Washington—

Toppenish—

M. C. Lane, B. S., *Asst. Ent., in charge.*
F. H. Shirck, M. S., *Jr. Ent.*

Walla Walla (branch of Toppenish lab.)—

K. E. Gibson, B. S., *Jr. Ent.*

Sweet-Potato Weevil Control.

FIELD OFFICES:

Alabama—Grand Bay (branch of Biloxi, Miss., office)—

S. C. Brummitt, *Sr. Sci. Aid.*

Florida—

Sanford (branch of Tampa, Fla., office)—

W. E. Stone, B. S., *Asst. Ent.*

Tampa—

B. L. Boyden, B. A., *Assoc. Ent., in charge.*
C. O. Bare, M. A., *Asst. Ent.*
J. W. McGlamery, B. S., *Jr. Ent.*

Mississippi—

Bay St. Louis (branch of Biloxi office)—

F. A. Wright, B. A., *Jr. Ent.*

Biloxi—

K. L. Cockerham, M. S., *Assoc. Ent., in charge.*
Troy Thompson, B. S., *Jr. Ent.*

Picayune (branch of Biloxi office)—

O. T. Deen, B. S., *Jr. Ent.*
P. K. Harrison, B. S., *Jr. Ent.*

Pea Insects.

FIELD LABORATORY:

Wisconsin—Madison—

J. E. Dudley, jr., B. S., *Assoc. Ent., in charge.*

E. M. Searls, B. S., *Asst. Ent.*

Alfred Weed, M. S., *Agt.*

Berry Insects.

FIELD LABORATORY:

Maryland—Sligo (post office, Silver Spring)—

C. H. Popenoe, B. S., *Assoc. Ent., in charge.*

Tobacco Insects.

FIELD LABORATORIES:

Florida—Quincy (branch of Clarksville, Tenn., lab.)—

F. S. Chamberlin, B. S., *Asst. Ent.*

North Carolina—Chadbourn (branch of Clarksville, Tenn., lab.):

J. N. Tenbet, *Jr. Ent.*

Tennessee—Clarksville—

A. C. Morgan, B. S., *Assoc. Ent., in charge.*

S. E. Crumb, A. B., *Assoc. Ent.*

K. B. McKinney, B. S., *Asst. Ent.*

J. U. Gilmore, B. S., *Asst. Ent.*

Mexican Bean Beetle.

FIELD LABORATORIES:

Alabama—Birmingham (branch of Columbus, Ohio, lab.)—

L. W. Brannon, B. S., *Asst. Ent.*

New Mexico—Estancia—

J. R. Douglass, M. S., *Asst. Ent., in charge.*

New York—Geneva (branch of Columbus, Ohio, lab.)—

Rodney Cecil, M. S., *Asst. Ent.*

Ohio—Columbus—

N. F. Howard, M. S., *Assoc. Ent., in charge.*

BEE CULTURE

J. I. Hambleton, B. S., *Apicult., in charge.*

Behavior of Bees.

W. J. Nolan, A. M., *Assoc. Apicult.*

Bee Diseases.

C. E. Burnside, M. S., *Asst. Apicult.*

Beekeeping Regions.

E. L. Sechrist, B. A., *Assoc. Apicult.*

Physiology of Bees.

J. W. Bulger, M. A., Ph. D., *Asst. Apicult.*

Intermountain Bee Culture.

FIELD LABORATORY:

Wyoming—Laramie—

A. P. Sturtevant, A. B., Ph. D., *Assoc. Apicult., in charge.*

J. E. Eckert, M. S., *Assoc. Apicult.*

STORED-PRODUCT INSECTS

(Including household insects)

E. A. Back, B. S., Ph. D., *Sr. Ent., in charge.*

R. T. Cotton, M. S., Ph. D., *Ent.*

H. B. Bradford, *Chief Sci. Illustr.*

Marion T. Van Horn, *Jr. Sci. Aid.*

Grain Insects.

FIELD LABORATORIES:

Georgia—Thomasville

S. E. McClendon, B. S., *Asst. Ent., in charge.*

Maryland—Sligo (post office, Silver Spring)—

G. W. Ellington, B. S., *Asst. Ent.*

Bean Weevils.

FIELD LABORATORY:

California—Alhambra

A. O. Larson, M. S., *Assoc. Ent., in charge.*

C. K. Fisher, B. S., *Asst. Ent.*

Dried-Fruit Insects.

FIELD LABORATORY:

California—Fresno—

Perez Simmons, B. S., *Assoc. Ent., in charge.*

J. C. Hamlin, M. S., *Assoc. Ent.*

W. D. Reed, B. S., *Asst. Ent.*

TROPICAL AND SUBTROPICAL PLANT INSECTS

A. C. Baker, B. S. A., Ph. D., *Sr. Ent., in charge.*

Eva B. Fitzgerald*, B. A., *Sci. Illustr.*

Abby Holdridge, *Jr. Sci. Aid.*

Camphor Scale.

FIELD LABORATORY:

Louisiana—New Orleans—

A. W. Cressman, B. S., *Asst. Ent., in charge.*

C. I. Bliss, M. S., Ph. D., *Assoc. Ent.*

Greenhouse and Bulb Insects.

C. A. Weigel, M. S., Ph. D., *Ent., in charge.*

Bessie M. Broadbent, B. S., *Jr. Ent.*

FIELD LABORATORIES:

California—Santa Cruz—

F. R. Cole, A. M., Ph. D., *Assoc. Ent., in charge.*

Washington—Puyallup—

C. F. Doucette, B. S., *Asst. Ent., in charge.*

Citrus Insects in Gulf Region.

FIELD LABORATORY:

Florida—Orlando—

W. W. Yothers, B. S., A. B., *Assoc. Ent., in charge.*

O. C. McBride, B. S., M. A., *Asst. Ent.*

Fruit Flies.
FIELD LABORATORIES:
Canal Zone—Ancon—
James Zetek, A. B., *Assoc. Ent.*
Ignacio Molino, LL. D., *Sci. Aid.*
Hawaii—Honolulu—
H. F. Willard, B. S., *Ent., in charge.*
A. C. Mason, M. S., *Assoc. Ent.*

Citrus Thrips.
FIELD LABORATORY:
California—Lindsay—
E. A. McGregor, A. M., *Assoc. Ent., in charge.*

TAXONOMY

S. A. Rohwer, *Sr. Ent., in charge.*
Eleanor T. Armstrong, *Sr. Sci. Illustr.*
Margaret C. Mansuy*, A. B., *Sr. Sci. Aid.*
Francis H. Noyes, *Asst. Sci. Illustr.*
C. S. Menagh, *Sci. Aid.*
Edna E. Sellens, *Jr. Sci. Aid.*
Mildred B. Everhart, *Under Sci. Helper.*
Nettie E. Crocker*, *Under Sci. Helper.*
Eunice Myers, *Under Sci. Helper.*
Catherine V. Locke*, *Under Sci. Helper.*
Nellie D. McConnell*, *Under Sci. Helper.*
Louie H. Richardson*, *Under Sci. Helper.*
Janet W. Armstrong, *Under Sci. Helper.*
Margery L. Gray, *Under Sci. Helper.*

Coleoptera.
A. G. Böving, B. Ph., M. S., Ph. D., *Ent.*
E. A. Chapin, Ph. B., M. S., Ph. D., *Assoc. Ent.*
H. S. Barber, *Assoc. Ent.*
W. S. Fisher, *Asst. Ent.*

Lepidoptera.
Wm. Schaus, M. A., D. Sc., *Assoc. Ent.*
Carl Heinrich, *Assoc. Ent.*
August Busck, *Assoc. Ent.*

Hymenoptera.
A. B. Gahan, M. S., *Ent.*
R. A. Cushman, *Assoc. Ent.*
Grace A. Sandhouse, A. M., *Jr. Ent.*

Diptera.
C. T. Greene, *Asst. Ent.*

Orthoptera and Neuroptera.
A. N. Caudell, M. S., *Assoc. Ent.*

Ectoparasites and Mites.
H. E. Ewing, M. A., Ph. D., *Assoc. Ent.*

Coccidae.
Harold Morrison, A. M., Ph. D., *Ent.*
Grace E. Glance, B. S., *Jr. Ent.*

INSECTS AFFECTING MAN AND ANIMALS

F. C. Bishopp, B. S., *Sr. Ent., in charge.*

Insects Affecting Animals.
FIELD LABORATORIES:
Texas—
Dallas—
E. W. Lauke, B. S., *Assoc. Ent.*
W. E. Dove, B. S., *Asst. Ent.*

Insects Affecting Animals—Continued.
FIELD LABORATORIES—Continued.
Texas—Continued.
Sonora (branch of Dallas lab.)—
O. G. Babcock, B. S., *Asst. Ent.*
Uvalde (branch of Dallas lab.)—
D. C. Parman, B. S., *Asst. Ent.*

Malaria Mosquitoes.
FIELD LABORATORY:
Louisiana—Mound—
W. V. King, B. S., Ph. D., *Ent., in charge.*
G. H. Bradley, B. S., *Asst. Ent.*
T. E. McNeel, B. S., *Jr. Ent.*

GIPSY MOTH AND BROWN-TAIL MOTH

(Hdqrs., Melrose Highlands, Mass.)

A. F. Burgess, M. S., *Sr. Ent., in charge of moth work.*
S. S. Crossman, B. S., *Ent.*
H. B. Dalton, *Admin. Asst.*

Field and Laboratory Research.
Massachusetts—Melrose Highlands (hdqrs.)—
C. W. Collins, M. S., *Ent.*
T. H. Jones, B. S., *Ent.*
J. N. Summers, B. S., Ph. D., *Assoc. Ent.*
C. F. W. Muesebeck, B. S., *Ent.*
R. T. Webber, *Assoc. Ent.*
S. M. Dohanian, M. S., *Assoc. Ent.*
M. T. Smulyan, B. S., Ph. D., *Asst. Ent.*
C. E. Hood, B. S., *Asst. Ent.*
D. F. Barnes, B. S., *Asst. Ent.*
P. B. Dowden, B. S., *Asst. Ent.*
W. F. Sellers, B. S., *Asst. Ent.*
S. F. Potts, M. S., *Asst. Ent.*
R. C. Brown, B. S., *Jr. Ent.*
D. L. Parker, B. S., *Jr. Ent.*
H. H. Richardson, B. S., *Jr. Ent.*
A. B. Proper, M. S., *Jr. Ent.*
J. V. Schaffner, jr., *Prin. Sci. Aid.*
R. Wooldridge, *Prin. Sci. Aid.*
I. T. Gulld, *Sr. Sci. Aid.*
H. I. Winchester, *Sr. Sci. Aid.*
J. E. R. Holbrook, *Sr. Sci. Aid.*
J. A. Millar, *Sr. Sci. Aid.*
C. L. Griswold, *Asst. Sci. Aid.*

Scouting and Extermination.
Massachusetts—Melrose Highlands (hdqrs.)—
H. L. Blaisdell, *Sr. Admin. Off.*
L. E. Gibson, B. S., *Admin. Asst.*
W. W. Bancroft, *Prin. Sci. Aid.*
H. N. Benn, *Prin. Sci. Aid.*
S. E. May, *Prin. Sci. Aid.*
F. W. Foster, *Sr. Sci. Aid.*
C. A. Melsane, *Sr. Sci. Aid.*
D. G. Murphy, *Sr. Sci. Aid.*
W. A. Collins, *Sr. Sci. Aid.*
J. A. Priest, *Sr. Sci. Aid.*
New Jersey—Bound Brook:
H. A. Ames, *Admin. Asst.*
C. T. Davis, *Prin. Sci. Aid.*

Scouting and Extermination—Continued.
New Jersey—Bound Brook—Continued.
F. W. Graham, *Sr. Sci. Aid.*
W. J. Nestle, *Sr. Sci. Aid.*

Quarantine and Inspection.
Massachusetts—Boston (hdqrs.)—
J. N. Summers, B. S., Ph. D., *Assoc. Ent.*
F. W. Graves, jr., *Chief Sci. Aid.*
W. J. Ahearn, *Sci. Aid.*
I. L. Bailey, *Sci. Aid.*
P. S. Coffin, *Sci. Aid.*
C. M. Emerson, *Sci. Aid.*
M. H. Feeney, *Sci. Aid.*
G. J. Galvin, *Sci. Aid.*
D. Harrington, *Sci. Aid.*
J. Keefe, *Sci. Aid.*
F. L. Keene, *Sci. Aid.*
R. W. Kennedy, *Sci. Aid.*
J. F. Keough, *Sci. Aid.*
J. F. McDevitt, *Sci. Aid.*
C. A. Manchester, *Sci. Aid.*
P. H. Meagher, *Sci. Aid.*
G. A. Miller, *Sci. Aid.*
J. F. Murray, *Sci. Aid.*
I. B. Newbegin, *Sci. Aid.*
L. H. Noble, *Sci. Aid.*
J. J. Roach, *Sci. Aid.*
W. Sarsfield, *Sci. Aid.*
A. C. Ward, *Sci. Aid.*

JAPANESE BEETLE

(Hdqrs., Riverton, N. J.)

Loren B. Smith, B. S., *Sr. Ent., in charge.*

FIELD LABORATORIES:
India—Shillong—
Curtis P. Clausen, M. S., *Ent., in charge.*
L. B. Parker, B. S., *Jr. Ent.*
Japan—Yokohama—
T. R. Gardner, B. S., *Asst. Ent.*
New Jersey—Riverton—
J. L. King, M. S., *Ent.*
W. E. Fleming, B. S., Ph. D., *Assoc. Ent.*
Henry Fox, B. S., Ph. D., *Assoc. Ent.*
B. R. Leach, B. S., *Assoc. Ent.*
E. R. Van Leeuwen, B. S., *Assoc. Ent.*
G. E. Spencer, M. S., *Asst. Ent.*
H. C. Hallock, LL. B., M. S., *Asst. Ent.*
H. A. Jaynes, B. S., *Asst. Ent.*
F. W. Metzger, B. S., *Asst. Ent.*
J. W. Balock, B. S., *Jr. Ent.*

FIELD LABORATORIES—Continued.
New Jersey—Riverton—Continued.
T. C. F. Cronin, B. S., *Jr. Ent.*
V. A. Johnson, B. S., *Jr. Ent.*
J. K. Holloway, B. S., *Jr. Ent.*
M. C. Swingle, B. S., *Jr. Ent.*
Robert W. Burrell, B. S., *Jr. Ent.*
F. E. Baker, B. S., *Jr. Ent.*
Edward Lundberg, B. S., *Jr. Ent.*
M. R. Osburn, *Field Asst.*
H. W. Allen, Ph. D., *Agt.*
E. A. Richmond, *Agt.*
R. L. Coffin, *Agt.*
R. J. Sim, *Agt.*
P. A. van der Meulen, *Agt.*
O. G. Anderson, *Agt.*
C. W. Stockwell, *Jr. Admin. Off., in charge of quar. and insp.*
R. W. Sherman, B. S., *Asst. Pl. Quar. Insp.*
W. A. Shinkwin, *Sr. Sci. Aid.*
H. B. Ward, *Agt.*
W. E. Cranston, *Agt., in charge of quar. in Delaware.*
R. Wagner, *Agt.*
A. R. Whitcraft, *Agt.*
C. H. Ballou, *Agt.*
G. K. Handle, *Agt., in charge of quar. in N. J.*
G. B. Stichter, *Agt.*
C. H. Zimmer, *Agt., in charge of quar. in N. Y.*
J. K. Gould, *Agt., in charge of quar. in Pa.*
J. P. Johnson, *Agt., in charge of quar. in Conn.*
F. E. Merhoff, *Agt.*
W. N. Dobbs, *Field Supvr. in Insect Control.*

INSECT PEST SURVEY

J. A. Hyslop, M. S., *Ent., in charge.*

BIOCLIMATICS

FIELD LABORATORY:
West Virginia—Mineral Wells—
A. D. Hopkins, Ph. D., *Sr. Ent., in charge.*
M. A. Murray, *Sr. Sci. Aid.*

INSECT PATHOLOGY

G. F. White, B. S., Ph. D., M. D., *Path., in charge.*

BUREAU OF BIOLOGICAL SURVEY

Paul G. Redington, A. B., M. F., *Chief.*
W. C. Henderson, A. B., LL. B., *Assoc. Chief.*
Ada B. Morrison,* *Sr. Admin. Asst., Asst. to Chief.*
W. H. Cheesman, Ph. B., *Ed., in charge information and ed. work.*
Lisle Morrison, *Sr. Admin. Asst., in charge exhibits, photographs, and pubs*

BUSINESS OPERATIONS

E. J. Thompson, LL. M., *Sr. Admin. Asst., in charge.*
E. J. Colman, LL. B., *Admin. Asst., in charge acct.*

DIVISION OF BIOLOGICAL INVESTIGATIONS

W. B. Bell, M. S., Ph. D., *Biol., in charge.*
E. A. Preble, *Biol.*
E. W. Nelson, M. A., D. Sc., *Sr. Biol.*
H. C. Oberholser, M. S., Ph. D., *Biol.*
H. H. T. Jackson, M. A., Ph. D., *Biol.*
A. H. Howell, *Biol.*
F. C. Lincoln, *Assoc. Biol.*
C. H. M. Barrett, *Sr. Sci. Aid, Taxidermist.*
May T. Cooke, A. B., *Sci. Aid.*
Jane S. Elliott,* *Sci. Aid.*
Viola S. Snyder,* *Asst. Sci. Aid.*

FIELD HEADQUARTERS:
Alaska—Fairbanks—
L. J. Palmer, B. S., *Biol., in charge Grazing Inv. and Reindeer Exp. Sta.*
W. B. Miller, B. S., *Asst. Range Exam.*
Arizona—Tucson—
W. P. Taylor, B. S., Ph. D., *Biol., Field Naturalist.*
District of Columbia—Washington—
Vernon Bailey, *Biol., Field Naturalist.*
Washington—Puyallup—
T. H. Scheffer, M. A., *Assoc. Biol., Field Naturalist.*
Wyoming—Jackson—
O. J. Murie, A. B., M. S., *Assoc. Biol., Field Naturalist.*

DIVISION OF ECONOMIC INVESTIGATIONS

A. K. Fisher, M. D., *Sr. Biol., in charge.*
Stanley P. Young, B. S., M. S., *Biol.*

Eradication Methods (field).
California—Berkeley:
F. E. Garlough, A. B., *Asst. Biol.*
Colorado—Denver (lab. hdqrs.):
S. E. Piper, B. S., *Assoc. Biol., Leader.*
E. E. Horn, *Asst. Biol.*
H. E. Williams, *Asst. Biol.*

Destruction of Predatory Animals (in coop. with States) (field).
Alaska—Juneau:
R. K. Stewart, *Leader.*
Arizona—Phoenix:
M. E. Musgrave, *Asst. Admin. Off., Leader.*
California—Sacramento:
C. G. Poole, *Asst. Admin. Off., Leader.*
W. F. Polson, *Jr. Pred. An. Insp.*
Colorado:
Denver (hdqrs. for Colo.)—
L. L. Laythe, B. S., *Asst. Biol., Leader.*

Destruction of Predatory Animals—Contd.
Colorado—Continued.
Monte Vista—
J. W. Crook, *Sr. Admin. Asst.*
Montrose—
G. M. Trickel, *Sr. Admin. Asst.*
Idaho:
Dubois—
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Destruction of Injurious Rodents (in coop. with States).
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[1] Cooperative warden.
[2] Cooperative warden; Reclamation Service employee.

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W. F. Brooks, B. S., *Hwy. Engr.*
R. H. Harrison, B. S. in C. E., *Hwy. Engr.*
F. M. Johnson, B. S. in C. E., *Hwy. Engr.*
J. W. Moore, *Hwy. Engr.*
J. R. Blair, B. S. in C. E., *Assoc. Hwy. Engr.*
W. C. Horton, *Assoc. Hwy. Engr.*
F. A. Knight, Ph. B. in C. E., *Assoc. Hwy. Engr.*
L. P. Scott, B. S. in C. E., *Assoc. Hwy. Engr.*
A. F. Haelig, B. S. in C. E., *Asst. Hwy. Engr.*
Kentucky—Frankfort:
M. Galbreath, B. S. in C. E., *Hwy. Engr.*
A. V. Helms, B. S. in C. E., *Assoc. Hwy. Engr.*

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R. E. Toms, C. E., *Dist. Engr.*
J. W. Ogier, B. S., *Hwy. Engr.*
C. E. Raynor, C. E., *Hwy. Engr.*
H. C. Wells, *Hwy. Engr.*
C. D. Snead, B. S. in C. E., C. E., *Hwy. Bridge Engr.*
J. S. Clay, B. S. in C. E., C. E., *Hwy. Bridge Engr.*
J. M. Angle, B. S. in C. E., C. E., *Assoc. Hwy. Bridge Engr.*
H. C. Headley, *Assoc. Hwy. Engr.*
W. G. White, B. S. in C. E., C. E., *Assoc. Hwy. Engr.*
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B. A. Scott, C. E., *Asst. Hwy. Engr.*
Florida—Gainesville—
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E. R. Epperson, B. S., *Assoc. Hwy Engr.*
Georgia—Atlanta—
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J. H. Ayres, B. S. in C. E., *Assoc. Hwy. Engr.*
W. F. King, M. A., *Assoc. Hwy. Engr.*
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L. D. Asmus, C. E., *Asst. Hwy. Engr.*
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South Carolina—Columbia—
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S. A. Obenshain, B. S. in C. E., C. E., *Assoc. Hwy. Engr.*
R. B. Smith, B. C. E., *Asst. Hwy. Engr.*
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G. L. Smith, C. E., *Assoc. Hwy. Engr.*

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A. M. Snow, B. S. in C. E., *Assoc. Hwy. Engr.*
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Batavia—
L. F. Clark, C. E., *Assoc. Hwy. Engr.*
Montour Falls—
R. B. Everts, *Assoc. Hwy. Engr.*
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H. E. Burke, C. E., *Hwy. Engr.*
C. H. Stillman, M. A., C. E., *Hwy. Engr.*
C. F. Ridgood, B. S. in C. E., *Assoc. Hwy. Engr.*
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B. F. Heldel, A. B., C. E., *Hwy. Engr.*

A. F. Gordon, B. S., *Hwy. Bridge Engr.*

A. E. McClure, C. E., *Assoc. Civil Engr.*

G. D. Ball, B. S. in C. E., *Assoc. Hwy. Engr.*

R. L. Devereaux, *Assoc. Hwy. Engr.*

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A. L. Hooper, C. E., *Assoc. Hwy. Engr.*

Ohio—Columbus:

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C. L. Hayward, C. E., *Assoc. Hwy. Engr.*

G. J. Goehl, *Asst. Hwy. Engr.*

I. W. Hall, *Asst. Hwy. Engr.*

Pennsylvania—Harrisburg:

A. C. Rapelje, *Hwy. Engr.*

H. R. Leland, *Assoc. Hwy. Engr.*

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A. C. Dunn, C. E., *Assoc. Hwy. Engr.*

West Virginia—Charleston:

Wm. Brewster, B. S., M. E., *Hwy. Engr.*

D. T. Brown, B. S. in E., *Assoc. Hwy. Engr.*

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C. F. Dixon, *Off. Engr.*

A. C. Link, B. S. in C. E., *Jr. Hwy. Engr.*

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E. M. Hulce, *Assoc. Hwy. Engr.*

B. F. Kitt, C. E., *Assoc. Hwy. Engr.*

L. F. Martin, B. S. in C. E., *Assoc. Hwy. Engr.*

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J. A. Elliott, A. B., B. S. C. E., *Hwy. Engr.*

R. B. Wright, B. S. in C. E., *Hwy. Bridge Engr.*

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H. A. Stoddart, B. S. in C. E., *Jr. Hwy. Engr.*

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H. Broberg, B. S. in C. E., *Asst. Hwy. Engr.*

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E. C. Brown, B. S. in C. E., *Hwy. Engr.*

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C. C. Morris, B. S. in C. E., *Hwy. Engr.*
J. D. Shaw, *Hwy. Engr.*
G. D. Whittle, B. S. in C. E., *Hwy. Bridge Engr.*
W. M. Austin, *Assoc. Hwy. Engr.*
F. R. Bonrickson, B. S. in C. E., *Assoc. Hwy. Engr.*
A. B. Brown, *Assoc. Hwy. Engr.*
D. L. MacBeath, *Assoc. Hwy. Engr.*
G. L. McLane, *Assoc. Hwy. Engr.*
J. L. Mathias, B. S. in C. E., *Assoc. Hwy. Engr.*
J. H. Obermuller, *Assoc. Hwy. Engr.*
H. S. Tolen, C. E., *Assoc. Hwy. Engr.*
W. R. F. Wallace, B. S. in C. E., *Assoc. Hwy. Engr.*
G. C. White, *Assoc. Hwy. Engr.*
J. W. Green, B. S. in C. E., *Assoc. Hwy. Bridge Engr.*
R. Pearson, B. S., *Assoc. Hwy. Bridge Engr.*
C. S. Bruning, *Asst. Hwy. Engr.*
J. E. Jensen, *Asst. Hwy. Engr.*
F. B. Lessman, B. S. in C. E., *Asst. Hwy. Engr.*
E. F. Strickler, *Asst. Hwy. Engr.*
W. H. Smith, B. S. in C. E., *Asst. Hwy. Engr.*
R. Thirion, B. S. in C. E., *Asst. Hwy. Engr.*
W. J. Ward, B. S. in C. E., *Asst. Hwy. Engr.*
R. Alvis, B. S. in C. E., *Jr. Hwy. Engr.*
J. E. Applegate, B. S. in C. E., *Jr. Hwy. Engr.*
M. Christensen, B. S. in C. E., *Jr. Hwy. Engr.*
H. E. Cunningham, B. S. in C. E., *Jr. Hwy. Engr.*
H. E. Dahman, B. S. in C. E., *Jr. Hwy. Engr.*
F. J. Dixon, B. S. in C. E., *Jr. Hwy. Engr.*
J. A. Killalee, B. S. in C. E., *Jr. Hwy. Engr.*

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Colorado—Denver (hdqrs. for dist.):
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A. E. Palen, B. S. in C. E., *Hwy. Engr.*
A. V. Williamson, *Hwy. Engr.*
L. F. Copeland, B. S. in C. E., *Hwy. Bridge Engr.*
C. F. Capes, *Assoc. Hwy. Engr.*
R. S. Corlew, *Assoc. Hwy. Engr.*
W. H. Curwen, B. S. in C. E., *Assoc. Hwy. Engr.*
L. A. Hamilton, *Assoc. Hwy. Engr.*
B. B. Hauser, B. C. E., *Assoc. Hwy. Engr.*

District No. 3—Continued.
Colorado—Denver—Continued.
W. M. Jeffrey, B. S. in C. E., *Assoc. Hwy. Engr.*
C. E. Learned, B. S. in C. E., *Assoc. Hwy. Engr.*
W. D. Ross, C. E., *Assoc. Hwy. Engr.*
J. D. Slye, C. E., *Assoc. Hwy. Engr.*
E. C. White, B. S. in C. E., *Assoc. Hwy. Bridge Engr.*
E. F. Gleason, B. S. in C. E., *Asst. Hwy. Engr.*
R. C. Jones, *Asst. Hwy. Engr*
J. G. Rose, B. S. in C. E., B. A., *Asst. Hwy. Engr.*
J. E. Williams, B. S. in C. E., *Asst. Hwy. Engr.*
H. E. Dalton, B. S. in A. E., *Jr. Hwy. Engr.*
G. W. Hoffman, B. S. in C. E., *Jr. Hwy. Engr.*
R. T. Turner, B. S. in C. E., *Jr. Hwy. Engr.*
W. H. Willesen, B. S. in A. E., *Jr. Hwy. Engr.*
G. M. Williams, B. S. in C. E., *Jr. Hwy. Engr.*
O. E. Gardner, *Jr. Hwy. Bridge Engr.*
New Mexico—Santa Fe—
H. P. Martin, B. S. in C. E., *Assoc. Hwy. Engr.*
L. C. Rockett, B. S. in C. E., *Assoc. Hwy. Engr.*

District No. 11 (Hdqrs. Juneau, Alaska).
M. D. Williams, B. S., *Acting Dist. Engr., in charge.*
Alaska—Juneau (hdqrs. for dist.)—
M. D. Williams, B. S., *Acting Dist. Engr.*
I. F. Winsor, *Assoc. Hwy. Engr.*
L. W. Turoff, B. S. in C. E., *Asst. Hwy. Engr.*

District No. 12 (Hdqrs., Ogden, Utah).
B. J. Finch, C. E., *Dist. Engr., in charge.*
Utah—Ogden (hdqrs. for dist.):
B. J. Finch, C. E., *Dist. Engr.*
E. E. Kidder, B. S. in C. E., *Hwy. Engr.*
B. W. Matteson, B. S., *Hwy. Engr.*
L. M. Huggins, B. S. in C. E., *Hwy. Bridge Engr.*
R. A. Brown, *Assoc. Hwy. Engr.*
C. W. Cross, B. S. in M. E., *Assoc. Hwy. Engr.*
J. F. English, C. E., *Assoc. Hwy. Engr.*
R. R. Mitchell, B. S. in C. E., *Assoc. Hwy. Engr.*
F. W. Smith, B. S. in C. E., *Assoc. Hwy. Engr.*
J. H. Young, *Assoc. Hwy. Engr.*
O. C. Lockhart, *Assoc. Hwy. Bridge Engr.*
P. Linford, *Asst. Hwy. Engr.*
K. S. Chamberlain, B. S. in A. E., *Jr. Hwy. Engr.*

District No. 12—Continued.
Utah—Ogden—Continued.
F. L. Davis, B. S. in C. E., *Jr Hwy. Engr.*
J. L. Hemmert, *Jr. Hwy. Engr.*
W. F. Heyman, B. S. in C. E., *Jr. Hwy. Engr.*
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Indiana—Ft. Wayne—
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Washington—Yakima—
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California—Continued.
Berkeley—Continued.
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W. A. Hutchins, LL. B., *Assoc. Irrig. Econ.*
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S. H. Beckett, B. S. in C. E., *Irrig. Engr.*
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Oregon—Portland—
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Biles, W. F., 9.
Biles, W. F., 17.
Billings, Nelson J., 41.
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Blair, J. R., 59.
Blair, James A., 37.
Blair, R. Eugene, 64.
Blair, T. A., 5.
Blaisdell, H. L., 51.
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Blake, Doris H., 49.
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Bohn, J. E., 71.
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Bollman, P. J., 70.
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Bowlby, Irving S., 21.
Bowling, J. D., jr., 30.
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Boyden, B. L., 49.
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Broadbent, Sam R., 43.
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Bryan, Mary K., 29.
Bryan, Philip H., 42.
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Buckhorn, W. J., 49.
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Buckner, Joel L., 36.
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Buffington, Everett F., 66.
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Buhrer, Edna M., 29.
Bulger, J. W., 50.
Bulger, Raymond O., 21.
Bullen, Robert J., 25.
Bullock, A. D., 17.
Bunting, Leatha D., 29
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Burch, Dallas S., 6.
Burdick, C. C., 58.
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Callander, William F., 64.
Callaway, Joseph, jr., 80.
Calvert, E. B., 5.
Cameron, J. F., 60.
Camfield, L. H., 18.
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Campbell, F. L., 46.
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Carpenter, A. H., 15.
Carpenter, Charles G., 64.
Carpenter, E. J., 45.
Carpenter, J. C., 58.
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Carr, J. L., 1.
Carr, J. M., 30.
Carr, L. M., 70
Carrero, J. C., 3.
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Chase, A. G., 72.
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Chase, Will H., 56.
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Clark, D. E., 37.
Clark, Edna L., 75.
Clark, Emily E., 63.
Clark, Ernest D., 26.
Clark, G. D., 67.
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Clark, J. S., 12.
Clark, K. G., 45.
Clark, L. F., 59.
Clark, P. B., 81.
Clark, Robert E., 37.
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DIRECTORY OF OFFICIALS AND ORGANIZATIONS CONCERNED WITH THE PROTECTION OF BIRDS AND GAME: 1927

Compiled by

TALBOTT DENMEAD

Deputy Chief United States Game Warden
Division of Migratory-Bird Treaty and Lacey Acts
Bureau of Biological Survey

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INTRODUCTION

The twenty-eighth[1] annual Directory of Officials and Organizations Concerned with the Protection of Birds and Game is issued for the convenience of game authorities, bird-protection organizations, and others in procuring information concerning game conditions and game laws. The organization and personnel of governmental establishments of this country, Canada, Newfoundland, and Mexico concerned with game matters are given, together with the names and addresses of officials of State-wide game and bird protective associations and societies, and of the principal national organizations interested in bird protection, including the advisory board, migratory-bird treaty act.

For more ready reference to the names of officials of governmental and other national, State, and Canadian organizations concerned with the protection of game, than in former issues of the directory, the lists of national organizations are inserted directly after the list of Federal officials, and all the organizations for each State are grouped immediately after the list of the game officials for that State. Similar arrangement has been made of national and provincial organizations in Canada.

Changes in the personnel of official organizations in the following States and Provinces have been made since the last directory (Department Circular No. 398) was issued: California, Georgia, Idaho, Iowa, Michigan, Montana, Nevada, New Mexico, North Carolina (which for the first time has established a commission to administer game matters in the State), North Dakota, Oklahoma, Oregon, Pennsylvania (where two additional members have been added to the commission, making a total of eight), Washington, Wyoming, British Columbia, New Brunswick, Nova Scotia, and Prince Edward Island.

[1] Previous editions may be consulted at many public libraries, as follows: 1900–1914, in Circulars of the Biological Survey; 1915–1918, in Documents of the Biological Survey; and 1919 to 1926, in Department of Agriculture Circulars.

New associations added to this directory are the Associated Outdoor Clubs of America, the Alabama Wild Life Conservation League, the Arizona Game Protective Association, the Associated Committees for Wild Life Conservation of Massachusetts, the New York and the North Dakota State divisions of the Izaak Walton League of America, and the Fish and Game Protective Association of Southwestern Ohio.

Several organizations that were formerly state-wide in scope have become local chapters of the Izaak Walton League of America. As local organizations are not included in this directory, this has resulted in the omission of the following associations: The Georgia Fish and Game Protective Association, the Louisiana Sportsmen's League, the Texas Game and Fish Conservation Association, and the Wisconsin Wild Life Protective Society.

Information concerning national and state-wide organizations interested in the protection of game is desired, including any changes in their personnel, for the use of the department and for revisions in the next edition of the directory. Persons wishing detailed information pertaining to State game and fish laws should communicate with game officials in States in which they are interested. Game laws are published in pamphlet form in all the States. Summaries of laws relating to game and of laws relating to fur animals in the United States, Canada, Newfoundland, and Mexico are published annually by the United States Department of Agriculture—for the season of 1927–28 in Farmers' Bulletins Nos. 1550 and 1552, respectively.

The names and addresses of United States game wardens, who enforce the migratory-bird treaty and Lacey Acts, will be found in the directory. Violations of the acts referred to may be reported to these wardens or directly to the Bureau of Biological Survey at Washington, D. C.

FEDERAL OFFICIALS

UNITED STATES DEPARTMENT OF AGRICULTURE

[Jurisdiction extended to game by the Lacey Act, approved May 25, 1900, and the migratory-bird treaty act, approved July 3, 1918, both of which are administered by the Bureau of Biological Survey, Washington, D. C.

The Alaska Game Commission, at Juneau, established under the Alaska game law of January 13, 1925, acts in an advisory capacity to the Secretary of Agriculture in the formulation of regulations for Alaska on game, birds, and land fur-bearing animals, and enforces the law and regulations; the executive officer is the chief representative of the Bureau of Biological Survey resident in Alaska. All Federal game and bird reservations in the Territory are administered through the Biological Survey.

The Forest Service administers the big-game reservations and national monuments under its jurisdiction, and cooperates with Federal and State officials in the enforcement of game laws on the national forests.]

Secretary of Agriculture, W. M. Jardine, Washington, D. C.

Chief, Bureau of Biological Survey, Paul G. Redington, Washington, D. C.

Associate Chief, Bureau of Biological Survey, W. C. Henderson, Washington, D. C.

Chief United States Game Warden, Harold P. Sheldon, Biological Survey, Washington, D. C.

Deputy Chief United States Game Warden, Talbott Denmead, Biological Survey, Washington, D. C.

United States game wardens: Harry Barmeier, 4947 Schollmeyer Avenue, St. Louis, Mo.; William L. Birsch, New Bern, N. C.; Thomas T. Bloxsom, Locustville, Va.; B. R. Britton, Box 185, Socorro, N. Mex.; M. A. Charlton, 2106 Summit Street, Columbus, Ohio; Frank Clarkson, Box 1168, Houston, Tex.; P. S. Farnham, Owego, N. Y.; P. K. Hilliard, 443 Harrisburg Ave., Chelsea Heights, Atlantic City, N. J.; William H. Hoffman, Box 1022, Mobile, Ala.; John Q. Holmes, Omaha, Nebr.; Jay V. Kelsey, Daytona Beach., Fla.; S. W. Linebaugh, Russellville, Ky.; George E. Mushbach, Box 438, Billings, Mont.; John E. Perry, Lock Box 301, Memphis, Tenn.; W. H. Ransom, Box 94, Spokane, Wash.; George M. Riddick, Box 815, Little Rock, Ark.; Kenneth F. Roahen, Box 306, Peoria, Ill.; B. H. Shaver, general delivery, St. Paul, Minn.; Bertrand E. Smith, 31 Wolcott Street, Portland, Me.; Orin D. Steele, Kansas City, Mo.; Ray C. Steele, 516 Post Office Building, Portland, Oreg.; George Tonkin, 211 Post Office Building, Berkeley, Calif.; E. B. Whitehead, Savannah, Ga.

Advisory Board, migratory-bird treaty act: Chairman, John B. Burnham, president, American Game Protective and Propagation Association, 233 Broadway, New York City; William C. Adams, director, division of fisheries and game, State House, Boston, Mass.; W. E. Albert, State fish and game warden, Des Moines, Iowa; Brooke Anderson, president Chicago Camp Fire Club, 38 South Dearborn Street, Chicago, Ill.; Alva Clapp, Atchison, Kans.; Ralph H. Clock, member board of fish and game commissioners, 1216 Security Bank Building, Long Beach, Calif.; William L. Finley, Jennings Lodge, Oreg.; E. H. Forbush, State ornithologist, State House, Boston, Mass.; J. F. Gould, State game and fish commissioner, Old State Capitol, St. Paul, Minn.; George Bird Grinnell, president Boone and Crockett Club, 238 East Fifteenth Street, New York City; Clark McAdams, St. Louis Post-Dispatch, St. Louis, Mo.; Marshall McLean, Camp Fire Club of America, 350 Madison Avenue, New York City; David H. Madsen, fish and game commissioner, Capitol Building, Salt Lake City, Utah; Thomas N. Marlowe, chairman State fish and game commission, Missoula, Mont.;

Lee Miles, chairman game and fish commission, Little Rock, Ark.; I. S. Myers, Akron, Ohio; T. Gilbert Pearson, president National Association of Audubon Societies, 1974 Broadway, New York City; I. T. Quinn, commissioner department of game and fisheries, Montgomery, Ala.; A. A. Richardson, chief game warden, Columbia, S. C.; S. F. Rathbun, supervisor of game and game fish, 404 Bell Street Terminal, Seattle, Wash.; Jordan B. Royall, State game commissioner, Tallahassee, Fla.; George Shiras, 3d, 4530 Klingle Street NW., Washington, D. C.

Officer in charge of game and bird reservations, E. A. Goldman, Biological Survey, Washington, D. C.

Forester, W. B. Greeley, Forest Service, Washington, D. C.

UNITED STATES DEPARTMENT OF THE INTERIOR

[The National Park Service administers the laws for the protection of game on national parks and also on the national monuments under the jurisdiction of the Department of the Interior.]

Secretary of the Interior, Hubert Work, Washington, D. C.

Director, National Park Service, Stephen T. Mather, Washington, D. C.

UNITED STATES DEPARTMENT OF COMMERCE

[The Bureau of Fisheries administers laws for the protection of fur seals on the Pribilof Islands and for the protection of sea otters, walruses, and sea lions in the Territorial waters of Alaska.]

Secretary of Commerce, Herbert Hoover, Washington, D. C.

Commissioner of Fisheries, Henry O'Malley, Washington, D. C.

CANAL ZONE

[By authority of Executive orders relative to police powers and hunting in the Canal Zone, the Governor of the Panama Canal has issued orders and regulations concerning hunting in the Canal Zone.]

Chief of Office, the Panama Canal, A. L. Flint, Washington, D. C.

Executive Secretary, the Panama Canal, C. A. McIlvaine, Balboa Heights, Canal Zone.

NATIONAL ORGANIZATIONS

American Bison Society.
President, Edmund Seymour, 41 Wall Street, New York City.
Secretary, M. S. Garretson, New York Zoological Park, New York City.

American Game Protective and Propagation Association (Inc.), 233 Broadway, New York City.
President, John B. Burnham.
Vice president, George Shiras, 3d.
Secretary, Carlos Avery.

American Ornithologists' Union.
President, Alexander Wetmore, U. S. National Museum, Washington, D. C.
Secretary, T. S. Palmer, 1939 Biltmore Street NW., Washington, D. C.

American Society of Mammalogists (Inc.).
President, Glover M. Allen, Museum of Comparative Zoology, Cambridge, Mass.
Corresponding secretary, A. Brazier Howell, U. S. National Museum, Washington, D. C.

Associated Outdoor Clubs of America
President, — — —.
Secretary, Raymond H. Torrey, 99–28 One-hundred and ninety-third Street, Hollis, New York City.

Boone and Crockett Club.
President, George Bird Grinnell, 238 East Fifteenth Street, New York City.
Secretary, Kermit Roosevelt, 44 Beaver Street, New York City.
Chairman, game preservation committee, W. Douglas Burden, New York City.

Camp Fire Club of America (Inc.).
President, Karl T. Frederick, 128 Broadway, New York City.
Secretary, W. R. Jolliffe, 921 Madison Avenue, New York City.

The Game Conservation Society (Inc.), 20 East Forty-second Street, New York City.
President, Dwight W. Huntington.
Secretary, Arthur M. Bartley.

International Association of Game, Fish, and Conservation Commissioners.
President, I. T. Quinn, Montgomery, Ala.
Secretary, R. P. Holland, 45 West Forty-fifth Street, New York City.

International Committee for Bird Protection. (Includes representatives of leading scientific and conservation societies in Australia, Austria, Canada, Czechoslovakia, France, Germany, Great Britain, Holland, Hungary, Italy, Japan, Luxemburg, New Zealand, Norway, Switzerland, South Africa, Sweden, and the United States.)
President, T. Gilbert Pearson, 1974 Broadway, New York City.

The Izaak Walton League of America.
President, Jacob M. Dickinson, 231 South La Salle Street, Chicago, Ill.
Secretary, Fred N. Peet, 214 West Huron Street, Chicago, Ill.

National Association of Audubon Societies (Inc.).
President, T. Gilbert Pearson, 1974 Broadway, New York City.
Secretary, Wm. P. Wharton, Groton, Mass.

National Game Conference.
Chairman, Lee Miles, Little Rock, Ark.
Secretary, Wakefield Dort, 233 Broadway, New York City.
Treasurer, Newbold L. Herrick, 233 Broadway, New York City.

National Conference on Outdoor Recreation.
Chairman, Chauncey J. Hamlin, 110 Delaware Avenue, Buffalo, N. Y.
Secretary, Arthur Ringland, Room 2034 Navy Building, Washington, D. C.

[New England] Federation of the Bird Clubs of New England (Inc.).
President, T. Gilbert Pearson, 1974 Broadway, New York City.
Secretary, Laurence B. Fletcher, Room 516, 50 Congress Street, Boston, Mass.

New York Zoological Society (Inc.).
(This society takes an active part in the protection of birds and game.)
President, Madison Grant, 101 Park Avenue, New York City.
Secretary, William White Niles, 27 Pine Street, New York City.

Permanent Wild Life Protection Fund.
Trustees: William T. Hornaday, 1 Bank Street, Stamford, Conn.; Clark Williams, 160 Broadway, New York City; James H. Perkins, president, Farmers' Loan & Trust Co., New York City.

Western Association of State Game Commissioners.
President, S. F. Rathbun, 404 Bell Street Terminal, Seattle, Wash.
Vice president, A. A. Sanders, Cheyenne, Wyo.

STATE OFFICIALS AND ORGANIZATIONS

[Organizations not heard from in 1927 are marked with an asterisk (*)]

ALABAMA

Department of Game and Fisheries, Montgomery.
Commissioner, I. T. Quinn (term expires January, 1931).
Publications: Game and fish laws; shrimp and oyster laws; bulletins; bird-day book (issued annually for public schools of State); quadrennial reports.

Alabama Game and Game Fish Protective Association.
President, George Stuart, Montgomery.
Secretary, Julius Frank, Montgomery.

Alabama Wild Life Conservation League.
President, E. F. Allison, Bellamy.
Acting secretary, J. H. Eddy, 1507 Empire Building, Birmingham.

**Alabama Fishermen and Hunters' Association.*
President, W. G. Oliver, Birmingham.
Secretary-treasurer, Ted Cottrell, Birmingham.

ALASKA

Alaska Game Commission, Juneau.
Chairman, first judicial division, Charles T. Gardner, Juneau (term expires June 30, 1929).
Second judicial division, ——— (term expires June 30, 1928).
Third judicial division, William H. Chase, Cordova (term expires June 30, 1931).
Fourth judicial division, Preston S. Whitney, Fairbanks (term expires June 30, 1930).
Executive officer and secretary of commission, H. W. Terhune, Juneau (chief representative of Bureau of Biological Survey in Alaska).
Publications: Alaska game law and regulations.

Alaska Fish and Game Club.
President, Glover C. Winn, Juneau.
Secretary-treasurer, A. P. Kashevaroff, Juneau.

ARIZONA

State Game Warden, Phoenix.
D. E. Pettis (term expires January 1, 1929).
Publications: Game laws; reports.

Arizona Game Protective Association.
President, F. T. Sutter, Bisbee.
Secretary, H. E. Cristy, Box 661, Warren.

Audubon Society.
President, Thomas K. Marshall, Tucson.
Secretary, Mrs. Harriet H. Thornber, 109 Olive Road, Tucson.

ARKANSAS

Game and Fish Commission, State Capitol Little Rock.
Chairman, Lee Miles, Little Rock (term expires March, 1931).
Harry A. Jones, Hot Springs (term expires March, 1931).
Charles H. Thompkins, Prescott (term expires March, 1931).
Harry Neelly Searcy (term expires March, 1931).
G. B. Ewin, McGehee (term expires March, 1931).
Secretary, Guy Amsler, Little Rock.
Publications: Game and fish laws; reports; Arkansas Conservationist, published quarterly.

CALIFORNIA

Board of Fish and Game Commissioners.
Terms, pleasure of governor.
President, I. Zellerbach, Postal Telegraph Building, San Francisco.
M. J. Connell, M. J. Connell Building, Los Angeles.
Ralph H. Clock, 1216 Security Bank Building, Long Beach.
Executive officer, B. D. Marx Greene, Postal Telegraph Building, San Francisco.
Chief of field patrol, J. S. Hunter, Postal Telegraph Building, San Francisco.
In charge department of fish culture, W. H. Shebley, Forum Building, Sacramento.
In charge department of commercial fisheries, N. B. Scofield, Postal Telegraph Building, San Francisco.
Publications: Fish and game laws; quarterly bulletin; biennial reports.

Associated Societies for the Conservation of Wild Life.
President William F. Bade, 2616 College Avenue, Berkeley.
Acting secretary, Mrs. A. S. Kibbe, 1534 Grove Street, Berkeley.

Associated Sportsmen's Clubs of California, 72 New Montgomery Street, San Francisco.
President, Harry S. Meyer.
Secretary, M. R. Obitz.

Audubon Association of the Pacific.
President, Frederick W. D'Evelyn, Phelan Building, San Francisco.
Secretary, Mrs. Carl Smith, 563 Forty-second Avenue, San Francisco.

Audubon Society.
President, Mrs. Harriet W. Myers, 311 North Avenue 66, Los Angeles.
Secretary, Helen S. Pratt, 2451 Ridge View Avenue, Eagle Rock, Los Angeles.

COLORADO

State Game and Fish Commissioner, State Capitol, Denver.
Roland G. Parvin (term indefinite—under civil service).
Publications: Game and fish laws; biennal reports.

Colorado Game and Fish Protective Association.
President, Otis E. McIntyre, Colorado Springs.
Secretary, J. M. Scoville, 1641 Stout Street, Denver.

Audubon Society.
President, Edward R. Warren, 1511 Wood Avenue, Colorado Springs.
Secretary, Elberta L. Craig, University of Colorado Museum, Boulder.

CONNECTICUT

State Board of Fisheries and Game, Hartford.
President, Frederic C. Walcott, Norfolk (term expires 1933).
Charles E. Wheeler, Stratford (term expires 1931).
Karl C. Kulle, Suffield (term expires 1929).
Superintendent, John W. Titcomb, State Capitol, Hartford.
State warden, A. Joseph Williamson, State Capitol, Hartford.
Publications: Game and fish laws; biennial reports.

Connecticut Fish and Game Protective Association.
President, George H. Scranton, Box 1145, 42 Church Street, New Haven.
Secretary and treasurer, ———.

Audubon Society.
President, John P. Holman, Fairfield.
Secretary, Mrs. Herbert P. Beers, Southport.

DELAWARE

Board of Game and Fish Commissioners.
President, H. C. Davis, Laurel (term expires 1927).
Vice president, John F. Lynn, Wilmington (term expires September, 1929).
Secretary and treasurer, Wilbert Rawley, Lepsic (term expires September, 1931).
Chief game and fish warden, John P. Le Fevre, Dover.
Publications: Game and fish laws; biennial reports.
**Delaware State Sportsmen's Association.*
President, W. A. Simonton, 6040 DuPont Building, Wilmington.
Secretary, H. D. Albaugh, Pennsgrove, N. J.

DISTRICT OF COLUMBIA

Metropolitan Police, Washington. (Has jurisdiction over matters pretaining to game.)
Superintendent, Edwin B. Hesse.
William P. Hess, commanding Harbor Precinct.
Audubon Society.
President, T. S. Palmer, 1939 Biltmore Street NW., Washington.
Secretary, Helen P. Childs, 5901 Connecticut Avenue, Chevy Chase, Md.

FLORIDA

Department of Game and Fresh-water Fish.
State game commissioner, Jordan B. Royall, Tallahassee.
Florida Game and Fish Protective Association.
President, M. O. Harrison, Palmetto.
Secretary, Louis Coombs, Sarasota.
**Florida Game and Fish Protective League.*
President, George S. Stone, Fort Myers.
Secretary, Rube Allyn, Ruskin.
Izaak Walton League of America (Fla. Div.).
President, A. F. Knotts, Yankeetown.
Secretary, C. S. Graham, 417 West Sixteenth Street, Jacksonville.
Audubon Society (Inc.)
President, Mrs. Katherine B. Tippetts, The Belmont, St. Petersburg.
Secretary, Mrs. Mary E. Apple, 925 Fifteenth Avenue, North, St. Petersburg.

GEORGIA

State Board of Game and Fish.
Chairman, M. O. Dunning, Savannah.
Charles S. Arnow, Kingsland.
D. M. Byrd, Atlanta.
Game and fish commissioner, Peter S. Twitty, Atlanta.
Tidewater commissioner, R. W. Clancy, Darien.
Publications: Game and fish laws; reports.

HAWAII

Board of Agriculture and Forestry.
Fish and Game Division:
Chairman, Bruce Cartwright, Honolulu.
Chief Territorial fish and game warden, H. G. Kelly, Box 3319, Honolulu.
Publications: Reports.
Hawaii Fish and Game Association.
President, W. E. Schoening, Hilo.
Secretary, Gilbert K. Patten, Hilo.
Hawaiian Fish and Game Protective Association.
President, Walter E. Wall, Honolulu.
Secretary, Irwin H. Spalding, Honolulu.
Kauai Fish and Game Association.
President, J. M. Kuhns, Lihue, Kauai.
Secretary, Albert Horner, Lihue, Kauai.

IDAHO

Fish and Game Department, Boise.
Warden, R. E. Thomas (term expires April 14, 1929).
Chief deputy, Turner Sparkman.
Fish commissioner, W. M. Keil.
Chief clerk, Vernon Thomas.
Publications: Fish and game laws; biennial reports.

ILLINOIS

Department of Conservation, Springfield.
Director, W. J. Stratton.
Assistant director, Frank E. Abbey.
Publications: Game and fish bulletins (annual).
Izaak Walton League of America (Ill. Div.).
President, Bob Scholes, 820 Jefferson Building, Peoria.
Secretary, William B. Kemp, 107 North Raynor Avenue, Joliet.
Illinois Sportsmen's League.
President, H. C. Norcross, Carlyle.
Secretary, August Semmelroth, Belleville.
**The Federated Sportsmen.*
President, N. E. Simonsen, 2243 Orrington Avenue, Evanston.
Secretary, C. F. Mansfield, jr., 835 South Second Street, Springfield.
**Illinois Game Protective Association.*
President, R. J. Wilcoxson, 1343 South Park Avenue, Springfield.
Secretary, C. F. Mansfield, jr., 835 South Second Street, Springfield.

INDIANA

Department of Conservation, State House, Indianapolis.
Chairman, Stanley Coulter.
Director (executive of department), Richard Lieber (term pleasure of commissioners).
Division of Fish and Game:
Superintendent, George N. Mannfeld.
Publications: Laws relating to natural resources, including fish and game laws; yearbook; special bulletins and findings.
Indiana Fish, Game, and Forest League.
President, H. H. Evans, Newcastle.
Secretary, Harry Murgenau, Hammond.
Izaak Walton League of America (Ind. Div.).
President, L. G. Bradford, 209 Citizens Bank Building, South Bend.
Secretary, Charles L. Biederwolf, State House, Indianapolis.
Audubon Society.
President, Samuel E. Perkins, 3d, 701 Inland Bank Building, Indianapolis.
Secretary, Mrs. Alma C. Gardner, 2302 North Alabama Street, Indianapolis.

IOWA

State Fish and Game Warden, Des Moines.
W. E. Albert (term expires March 31, 1929).
Publications: Fish and game laws; biennial reports.
State Board of Conservation: Investigates and acquires sites for public State parks and otherwise conserves the wild life of the State.
Chairman, Clifford Niles, Anamosa.
W. E. Saunders, Emmetsburg.
Mary C. Armstrong, Fort Dodge.
Mrs. Henry Frankel, Des Moines.
J. G. Wyth, Cedar Falls.
Secretary, W. C. Meckens, Des Moines.

Iowa Conservation Association.
President, S. N. Darling, Iowa State College, Ames.
Secretary, G. B. MacDonald, Iowa State College, Ames.
Izaak Walton League of America (Iowa Div.).
President, A. C. Willford, Waterloo.
Secretary, Harry L. Erwin, Grand Junction.

KANSAS

State Fish and Game Warden, Pratt.
J. B. Doze (term, pleasure of Forestry, Fish, and Game Commission).
Publications: Fish and game laws; bulletins; biennial reports and news service.
Kansas State Game Preservation Association.
President, W. A. Ayres, 407 Fourth National Bank Building, Wichita.
Secretary, J. B. Doze, Pratt.
Kansas Fish and Game Protective Association.
President, W. W. Wiseman, Delphos.
Secretary-treasurer, J. M. Hall, Bennington.
Izaak Walton League of America (Kans. Div.).
President, A. L. Scott, Pittsburg Elevator Co., Pittsburg.
Secretary, E. G. Matthews, 1431 Polk Street, Topeka.

KENTUCKY

Game and Fish Commission, Frankfort.
Chairman, Ray B. Moss, Pineville (term expires June, 1928).
J. B. Gatliff, Williamsburg (term expires June, 1928).
Alanson Trigg, Glasgow (term expires June, 1930).
T. B. Watts, Louisville (term expires June, 1928).
Executive agent, George C. Waggoner, Frankfort (term expires June, 1928).
Superintendent of wardens, C. J. Meredith, Frankfort.
Publications: Fish and game laws; bulletins; biennial reports.
Kentucky Game and Fish Protective Association.
President, James P. Gregory, Inter-Southern Building, Louisville.
Secretary, J. T. Smith, 614 South Shelby Street, Louisville.
Izaak Walton League of America (Ky. Div.)
President, J. Quincy Ward, Cynthiana.
Secretary, James T. Ware, Danville.
Audubon Society.
President, Chas. K. Morrell, 119 East Maxwell Street, Lexington.
Secretary, Eugene E. Simpson, 203 East Fourth Street, Lexington.
Audubon Society.
President, Mary Florence Taney, 309 East Third Street, Covington.
Secretary, Charles W. Senles, Hermes Avenue, Covington.

LOUISIANA

Department of Conservation, Court Building, New Orleans.
Commissioner, V. K. Irion (term expires August, 1929).
Publications: Fish, oyster, game, mineral, and forestry laws; economic bulletins; biennial reports.
Izaak Walton League of America (La. Div.)
National director, T. W. Willis, Shreveport.

MAINE

Commissioner of Inland Fisheries and Game, State House, Augusta.
Willis E. Parsons (term expires April 22, 1930).
Publications: Fish and game laws; biennial reports.
Maine Sportsmen's Fish and Game Association.
President, Blaine S. Viles, Augusta.
Secretary, Frank W. Wardwell, 32 Exchange Street, Portland.

MARYLAND

Conservation Department, 512–14 Munsey Building, Baltimore.
Commissioner, Swepson Earle (term expires May, 1931).
State game warden, E. Lee LeCompte.
Chief deputy game warden, Charles F. Smith.
Secretary, Harold Smith Kolmer.
Publications: Fish and game laws; annual reports; Maryland Conservationist, published quarterly.
Maryland State Game and Fish Protective Association (Inc.).
President, P. M. Womble, 2901 Elliott Street, Baltimore.
Secretary, William H. Fisher, Stock Exchange Building, 210 East Redwood Street, Baltimore.
Audubon Society.
Acting president, P. T. Blogg, Howard and Fayette Streets, Baltimore.
Acting secretary, Talbott Denmead, 2830 St. Paul Street, Baltimore.

MASSACHUSETTS

Department of Conservation, State House, Boston.
Commissioner, William A. L. Bazeley.
Division of Fisheries and Game:
Director, William C. Adams.
Publications: Fish and game laws; annual reports.
Massachusetts Fish and Game Protective Association (Inc.).
President, John C. Phillips, Wenham.
Secretary, Edward Brooks, 3 Joy Street, Boston.
Associated Committees for Wild Life Conservation.
Chairman, John L. Saltonstall, 53 State Street, Boston.
Secretary, Laurence B. Fletcher, Room 516, 50 Congress Street, Boston.
Audubon Society.
President, Robert Walcott, Boston.
Secretary-treasurer, Winthrop Packard, 66 Newbury Street, Boston.

MICHIGAN

Department of Conservation, Lansing.
Chairman, Howard B. Bloomer, Detroit.
Director, L. J. Young, Lansing.
Secretary and chief deputy, George R. Hogarth, Lansing.
Publications: Biennial reports; game and fish laws (published by secretary of State).
Izaak Walton League of America (Mich. Div.).
President, H. A. Savage, Saginaw.
Secretary, Leon J. Von Scholck, Hotel Tuller, Detroit.
Audubon Society.
President, Mrs. Edith C. Munger, Hart.
Secretary, Mrs. Frank Lee DuMond, 2416 Elmwood Boulevard, East Grand Rapids.

MINNESOTA

Department of Conservation.
Chairman, G. M. Conzet, commissioner of forestry and fire prevention, Old Capitol, St. Paul.
Commissioner of lands and timber, Ray P. Chase, State Capitol, St. Paul.
State game and fish commissioner, J. F. Gould, Old Capitol, St. Paul (term expires July 1, —).
Publications: Game and fish laws; quarterly bulletin; special reports; catalogue of fishes; biennial reports.
Minnesota Game Protective League.
President, Sam Anderson, Hutchinson.
Secretary, Al. Evans, St. Paul Dispatch, St. Paul.
Izaak Walton League of America (Minn. Div.).
President, Geo. H. Selover, Thorpe Building, 523 Marquette Avenue, Minneapolis.
Secretary, Fred. H. Doelner, Box 153, Winona.

MISSISSIPPI

[For information regarding game laws address Walker Wood, secretary of State, Jackson.]
**Audubon Society.*
President, William Hemmingway, University.
Secretary, H. G. McGowan, Columbus.

MISSOURI

Game and Fish Commissioner, Jefferson City.
Keith McCanse (term expires May 17, 1929).
Chief deputy, J. O. Cottle.
Chief of wardens, Frank H. DeCou.
Publications: Game and fish laws; annual reports; game and fish news.
Missouri Fish and Game League (Inc.).
President, Samuel C. Davis, Security Building, St. Louis.
Secretary, Herbert Taylor, 512 Commercial Building, St. Louis.
Izaak Walton League of America (Mo. Div.).
President, George Johns, St. Louis Post-Dispatch, St. Louis.
Secretary, Harry A. Collin, 506 Security Building, St. Louis.
Audubon Society.
President, Hermann von Schrenk, 4276 Flad Avenue, St. Louis.
Secretary, R. J. Terry, 5575 Waterman Avenue, St. Louis.

MONTANA

State Fish and Game Commission.
Chairman, Thomas N. Marlowe, Missoula (term expires April 15, 1929).
Secretary and State fish and game warden, Robert H. Hill, Helena.
J. L. Kelly, Anaconda (term expires April 15, 1928).
G. T. Boyd, Great Falls (term expires April 15, 1931).
E. A. Wilson, Livingston (term expires April 15, 1930).
W. K. Moore, Billings (term expires April 15, 1930).
Publications: Fish and game laws; biennial reports.
Montana Sportsmen's Association.
Chairman, Glen A. Smith, Missoula.
Secretary-treasurer, M. S. Carpenter, Missoula.

NEBRASKA

Department of Agriculture, Lincoln.
Secretary, H. J. McLaughlin.
Assistant secretary, J. W. Mayer.
Bureau of Game and Fish:
State game warden, F. B. O'Connell.
Publications: Game and fish laws; biennial reports of department; Outdoor Nebraska.
Nebraska State Sportsmen's Association.
President, Cliff R. Galley, Columbus.
Secretary, George L. Carter, 425 South Twenty-ninth Street, Lincoln.
Izaak Walton League of America (Nebr. Div.).
President, Frank J. Brady, Atkinson.
Secretary, John C. Andrews, 904 South Fourth Street, Norfolk.

NEVADA

State Fish and Game Commission (terms four years, expire 1931).
Chairman, Edwin H. Rogers, McGill.
Vice-president, Robert L. Douglas, Fallon.
Secretary, James W. Gerow, Box 864, Reno.
Pierre P. Garven, Reno.
Eber M. Steninger, Elko.
Publications: Game and fish laws; biennial reports of secretary of State.
Nevada State Fish and Game Protective League.
President, Alfred Ward, Reno.
Corresponding secretary, George I. James, 919 Jones Street, Reno.

NEW HAMPSHIRE

Fish and Game Commissioner, State House, Concord.
Mott L. Bartlett (term expires June 1, 1928).
Chief clerk, Miss Doris G. White.
Publications: Game and fish laws; biennial reports.
New Hampshire Fish and Game League.
President, Arthur M. Dunstan, Tilton.
Secretary, H. A. Sleeper, Claremont.
Izaak Walton League of America (N. H. Div.).
President, A. Erland Goyette, Peterboro.
Secretary, Algie A. Holt, Peterboro.
Audubon Society.
President, Elbert Wheeler, Nashua.
Secretary, George C. Atwell, Strafford.

NEW JERSEY

Board of Fish and Game Commissioners, Trenton.
President, H. J. Burlington, Montvale (term expires November 25, 1930).
Treasurer, Lewis Spinks, Jersey City (term expires March 25, 1932).
Alex. H. Phillips, Princeton (term expires November 25, 1928).
Charles F. Hunter, Palisade (term expires March 25, 1932).
Harry T. Hagaman, Lakewood (term expires November 27, 1927).
George C. Warren, jr., Summit (term expires November 25, 1929).
Henry M. Armstrong, Jersey City (term expires March 25, 1932).
Secretary, Walter H. Fell, Trenton.
Fish and game protector, James M. Stratton, North Long Branch.
Publications: Fish and game laws; annual report.
New Jersey Fish and Game Conservation League.
President, Eugene Connet, 3d, South Orange.
Secretary, John S. Schwinn, 56 Clinton Street, Newark

Audubon Society.
President, Philip B. Philipp, 220 Broadway, New York City.
Secretary-treasurer, Beecher S. Bowdish, 164 Market Street, Newark.

NEW MEXICO

State Game and Fish Commission.
Chairman, Charles Proebstel, Santa Fe (term expires 1933).
K. J. Baldridge, Albuquerque (term expires 1933).
W. A. Losey, Hagerman (term expires 1929).
Secretary and State game warden, E. L. Perry, Santa Fe (term expires at pleasure of board).
Publications: Game and fish law; reports.
New Mexico Game Protective Association.
President, Colin Neblett, Santa Fe.
Secretary, E. L. Safford, Santa Fe.

NEW YORK

Conservation Commission, Albany.
Commissioner, Alexander Macdonald, Albany (term expires December 31, 1928).
Deputy commissioner, Francis X. Disney, Elmira.
Secretary, Herbert F. Prescott, Albany.
Division of Fish and Game.
Chief game protector, Llewellyn Legge, 23 South Pearl Street, Albany.
Publications: Conservation laws, including forest, fish, and game laws; maps; annual reports; bulletins on forestry and wild life.
New York Association for the Protection of Game (Inc.).
President, J. Fred Pierson, 29 Broadway, New York City.
Secretary, John C. O'Conor, 15 Williams Street, New York City.
New York State Fish, Game, and Forest League (Inc.).
President, Phay B. Rutan, Elmira.
Executive secretary, Cronk S. Rogers, 312 Cahill Building, Syracuse.
Izaak Walton League of America (N. Y. Div.).
President, Ward B. Edwards, 113 White Building, Utica.
Secretary, Leon Porter, 113 White Building, Utica.

NORTH CAROLINA

Department of Conservation and Development, Raleigh.
Director, Wade H. Phillips, Raleigh.
Publications: Game laws.
North Carolina Game and Fish Development League.
President, R. T. Stedman, Winston-Salem.
Secretary, James F. Hoge, Greensboro.

NORTH DAKOTA

Game and Fish Board.
President, C. H. Nottimier, Valley City (term expires April 1, 1931).
Vice president, R. R. Halstead, Beach (term expires April 1, 1931).
Secretary, M. A. Hoghaug, Devils Lake (term expires April 1, 1929).
Game and fish commissioner, C. P. Peterson, Bisbee (term expires April 1, 1929).
District game wardens:
Chief warden, District No. 1, J. W. Benson, Rolette (term expires April 1, 1929).
State-wide warden, District No. 1, C. H. Tolen, Mayville (term expires April 1, 1929).
Chief warden, District No. 2, R. A. Kinzer, Litchville (term expires April 1, 1929).
State-wide warden, District No. 2, S. J. King, Bismarck (term expires April 1, 1929).
Publications: Game and fish laws; biennial reports.
North Dakota State Sportsmen's Association.
President, J. W. Johnson, Fargo.
Secretary, A. C. Lacy, Fargo.
Izaak Walton League of America (N. Dak. Div.).
President, A. M. Christianson, Bismarck.
Secretary, S. W. Thompson, Devils Lake.
Audubon Society.
President, E. T. Judd, Cando.
Secretary, O. A. Stevens, 1110 Tenth Street, North, Fargo.

OHIO

Department of Agriculture, Columbus.
Director and chief executive officer, Charles V. Truax.
Fish and Game Division:
Chief warden, Dent O. Thompson.
Publications: Fish and game laws; annual reports.
League of Ohio Sportsmen.
President, I. S. Myers, 306 Metropolitan Building, Akron.
Executive secretary, A. C. Baxter, 236 Rowlands Building, Columbus.
Editor-in-chief, J. W. Stuber, Y. M. C. A. Building, Columbus.
Fish and Game Protective Association of Southwestern Ohio.
President, James N. Dugan, 5623 Eastern Avenue, Cincinnati.
Secretary, W. H. Burtner, 500 Keith Building, Cincinnati.
Izaak Walton League of America (Ohio Div.).
President, A. F. Long, Court House, Springfield.
Secretary, Stanley C. Hathaway, Court House, Springfield.
Audubon Society.
President, Wm. G. Cramer, 2301 Kemper Lane, W. H., Cincinnati.
Secretary, Katherine Ratterman, 2975 Springer Avenue, Cincinnati.

OKLAHOMA

State Fish and Game Commission.
Chairman, M. H. Shepard, Chickasha.
Vice chairman, O. P. Slack, Atoka.
Secretary, S. H. Harris, Oklahoma City.
Warden, Ray O. Weems, Oklahoma City.
Assistant warden, W. T. Hunt, Oklahoma City.
Publications: Game and fish laws; reports.
Izaak Walton League of America (Okla. Div.).
President, Frank J. Burford, First National Bank Building, Oklahoma City.
Secretary, F. J. Hill, 1119 East Tenth Street, Oklahoma City.

OREGON

State Game Commission.
Chairman, I. N. Fleischner, Portland (term expires February 25, 1930).
M. F. Corrigan, McMinnville (term expires February 25, 1928).
M. A. Lynch, Redmond (term expires February 25, 1929).
Ben. F. Dorris, Eugene (term expires February 25, 1931).
L. A. Wright, Union (term expires February 25, 1932).
Secretary and State game warden, Harold Clifford, 202 Pittock Block, Portland.
Publications: Game laws; annual and biennial reports; Oregon Sportsman.

Oregon State Sportsmen's Association.
President, E. K. Piasecki, Dallas.
Secretary, Nate Otterbein, Klamath Falls.
Eastern Oregon Sportsmen's Association.
President, Harry Kennard, Vale.
Secretary, Albert Curry, La Grande.
Audubon Society.
President, Willard A. Eliot, 1011 Thurman Street, Portland.
Secretary, ————.

PENNSYLVANIA

Board of Game Commissioners, Harrisburg.
President, H. J. Donaldson, 410 Pine Street, Williamsport (term expires 1930).
Vice President, Jared M. B. Reis, New Castle (term expires 1930).
Adolf Muller, Norristown.
Francis H. Coffin, Scranton (term expires 1930).
Franklin G. McIntosh, Franklin (term expires 1930).
Richard E. Reitz, Brookville (term expires April 24, 1929).
Harry C. Stackpole, St. Marys (term expires June 24, 1929).
Ross L. Seffler, McKeesport (term expires June 24, 1929).
Executive secretary, J. B. Truman, Capitol Building, Harrisburg.
Publications: Game, fish, and forestry laws; bulletins; biennial reports.
Central Pennsylvania Fish and Game Conservation Association (Inc.).
President, Edson J. Hockenbury, 200 North Third Street, Harrisburg.
Executive secretary, W. H. German, 14 South Market Square, Harrisburg.
Izaak Walton League of America (Pa. Div.).
President, Wm. H. Moore, 1428 North Sixteenth Street, Philadelphia.
Secretary, Walter E. Wolfe, 824 Park Avenue, Williamsport.
Pennsylvania State Sportsmen's Association (Inc.).
President, C. D. Henline, Bradford.
Secretary, J. E. Schroll, Mount Joy.
United Sportsmen of Pennsylvania.
President, W. H. Kreitz, Shavertown.
Secretary, Charles R. Kelchner, 52 East Pettebone Street, Forty-Fort (Kingston P. O.).
Wild Life League of Pennsylvania.
President, J. Fred McKean, New Kensington.
Secretary, H. Borrell, Meadville.
Audubon Society.
President, Witmer Stone, Academy of Natural Sciences, Philadelphia.
Secretary, Elizabeth Wilson Fisher, 2222 Spruce Street, Philadelphia.

RHODE ISLAND

Commissioners of Birds.
Chairman, Everett L. Walling, 1022 Hospital Trust Building, Providence.
Clifton L. Tallman, Newport.
John Barlow, Kingston.
Alexander G. Eales, Bristol.
Everett L. Barrus, Coninicut.
All terms expire January 31, 1929.
Publications: Game laws; annual reports.
Rhode Island Fish and Game Protective Association.
President, Albert T. Sisson, 115 Clifford Street, Providence.
Secretary, H. L. Palmer, 34 Colfax Street, Providence.
**Audubon Society.*
President, Marion D. Weston, Rhode Island College of Education, Providence.
Secretary, Mary A. Leonard, 30 Barnes Street, Providence.

SOUTH CAROLINA

Chief Game Warden.
A. A. Richardson, Columbia (term expires March 1, 1929).
Publications: State game laws; annual reports.

SOUTH DAKOTA

Game and Fish Commission, Pierre.
Chairman, Fred H. Hildebrandt, Watertown.
Vice chairman, W. M. Boland, Rapid City.
L. Lapier, Huron.
Clate R. Tinan, Kimball.
A. G. McBride, Lake Andes.
Charles Boreson, Ideal.
Director of game and fish, O. H. Johnson, Pierre.
State game warden, A. Saunders, Huron.
Publications: Game laws; annual reports; booklet on wild-fowl and fish attractions of South Dakota.
South Dakota Game and Fish Protective Association.
President, John Ruckman, Aberdeen.
Secretary-treasurer, W. J. Tiffany, Aberdeen.
Izaak Walton League of America (S. Dak. Div.).
President, William H. Huxtable, Deadwood.
Secretary-treasurer, George H. Wolfe, Deadwood.

TENNESSEE

State Game and Fish Warden, Nashville.
George R. Calhoun (term expires at pleasure of governor).
Publications: Game and fish laws; reports.
Tennessee Game and Fish Association.
President, George R. Calhoun, Memorial Building Nashville.
Secretary, W. R. Manier, Chamber of Commerce, Nashville.
Tennessee Game and Fish Protective Association.
President, Joseph H. Acklen, Nashville.
Secretary, O. F. Noel, Noel Block, Nashville.
**Audubon Society.*
President, Mrs. Walter Barton, 701 Eleventh Street, Knoxville.
Corresponding secretary, Mrs. S. T. Weaver, 1606 Highland Avenue, Knoxville.

TEXAS

Game, Fish, and Oyster Commissioner, Austin.
Will J. Tucker (term expires September 1, 1929).
Chief deputy, Beal Jester.
Publications: Game, fish, oyster, sand, shell, and gravel laws; annual reports.
Texas Fish and Game League.
President, Julius E. Yanch, Chronicle Building, Houston.
Secretary, Robert B. Laurence, 411 Westmoreland Avenue, Houston.
Texas Game and Fish Protective Association.
President, Wesley Peacock, San Antonio.
Secretary, George C. Shupee, San Antonio.
Izaak Walton League of America (Texas Div.).
President, John A. Stanfield, 806 Flat Iron Building, Fort Worth.
Secretary, Robert E. Nesmith, 1609 Elm Street, Dallas.

UTAH

State Fish and Game Commissioner, Capitol Building, Salt Lake City.
David H. Madsen (term expires March 8, 1931).
Publications: Fish and game laws; biennial reports; bulletins.

**Utah State Fish and Game Protective Association.*
President, E. M. Bagley, Kearns Building, Salt Lake City.
Secretary-treasurer, Clarence Evans, care Motor Car Equipment Co., Salt Lake City.

VERMONT

Fish and Game Commissioner, Montpelier.
Linus Leavens (term expires February 1, 1928).
Chief game warden, E. L. Flanders.
Publications: Fish and game laws; biennial reports; pheasant culture manual.

Vermont Fish and Game League.
President, Lester H. Greene, Montpelier.
Secretary, H. P. Sheldon, Biological Survey, Washington, D. C.

VIRGINIA

Department of Game and Inland Fisheries.
716 State Office Building, Richmond.
Commissioners, A. Willis Robertson, chairman, Lexington.
Beverly W. Stras, jr., Tazewell.
Allen Epes, Blackstone.
Wm. S. Snow, Alexandria.
Samuel P. Goodloe, Afton.
Executive secretary, M. D. Hart, 716 State Office Building, Richmond.
Publications: Game and fish laws; reports; Game and Fish Conservationist, published bimonthly.

**Association of Shenandoah Valley Game and Fish Protective Clubs.*
President, Edward C. Martz, Harrisonburg.
Secretary-treasurer, H. W. Bertram, Harrisonburg.

Eastern Shore Game Protective Association of Virginia.
President, J. W. Bowdoin, Bloxom.
Secretary and treasurer, T. W. Blackstone, Accomac.

Virginia Game and Game Fish Protective Association.
President, C. B. Cook, Richmond.
Secretary-treasurer, Miss Nina Randolph, Virginia Beach.

Audubon Society.
President, M. D. Hart, Richmond.
Secretary, Mrs. R. B. Smithey, Ashland.

WASHINGTON

Department of Fisheries and Game.
Director of fisheries and game, Charles R. Maybury, Olympia (term, pleasure of governor).
Supervisor, division of fisheries, Charles R. Pollock, 414 Bell Street Terminal (P. O. Box 384), Seattle.
Supervisor, division of game and game fish, S. F. Rathbun, 404 Bell Street Terminal (P. O. Box 384), Seattle.
Publications: Seasons and bag limits on game and fur-bearing animals, upland and migratory game birds, and game fish; biennial reports.

Washington State Association of County Game Commissioners and Game Wardens.
President, Wm. B. Weaver, Ione.
Secretary-treasurer, A. J. Beach, 407 County-City Building, Seattle.

Washington State Sportsmen's Association.
President, Charles D. Hessey, Yakima.
Secretary, William G. Long, 448 Central Building, Seattle.

Audubon Society.
President, _____.
Corresponding secretary, F. W. Cook, 1604 East Harrison Street, Seattle.

WEST VIRGINIA

Game and Fish Commission, Charleston.
Chairman, C. A. Cabell, Carbon (term expires July 1, 1928).
George D. Curtin, Clarksburg (term expires July 1, 1930.)
Edward Cooper, jr., Bramwell (term expires July 1, 1929).
Chief game protector, A. B. Brooks, Buckhannon.
Chief deputy game protector, Jennings J. Summers, Charleston.
Chief forest-fire warden, P. M. Browning, Charleston.
Publications: Game and fish laws; annual reports.

**Wild Life League of West Virginia.*
President, H. H. Haynes, Clarksburg.
Treasurer, Glenn Hunter, Morgantown.

Audubon Society.
President, Bitha Craig, 1504 Avery Street, Parkersburg.
Secretary, Walter Donaghho, Box 532, Parkersburg.

WISCONSIN

State Conservation Commission.
Chairman, William Mauthe, Fond du Lac.
Secretary, E. M. Dahlberg, Ladysmith.
Eugene Wengert, 1019 Grant Boulevard, Milwaukee.
O. C. Lemke, Wausau.
A. W. Ickes, 735 South Jackson Street, Green Bay.
F. L. Gilbert, 1 West Main Street, Madison.
Conservation director, Elmer S. Hall, Madison.
Publications: Game and fish laws; biennial reports.

Izaak Walton League of America (*Wis. Div.*).
President, Sherman Brown, Davidson Theater, Milwaukee.
Secretary, Frank N. Graass, Sturgeon Bay.

WYOMING

State Game and Fish Commission.
President, John T. Scott, Casper (term expires December 31, 1929).
Vice president, Elmer Cook, Cheyenne (term expires December 31, 1933).
James Simpson, Jackson (term expires December 31, 1929).
A. J. Martin, Cody (term expires December 31, 1933).
Harry Churchill, Sheridan (term expires December 31, 1931).
Robert A. Hocker, Kemmerer (term expires December 31, 1931).
Secretary and commissioner, Bruce Nowlin, Cheyenne (term expires December 31, 1931).
Publications: Game and fish laws; reports.

Wyoming Game Protective Association.
President, Sam W. Aldrich, Ishawooa.
Secretary, I. H. Larom, Valley.

Izaak Walton League of America (*Wyo. Div.*).
President, Thomas Winecoff, Riverton.
Secretary, Frank G. Martin, Riverton.

State of Wyoming Game and Fish Protective Association.
President, Elmer H. Cook, Cheyenne.
Secretary, T. C. Thompson, 301 Hynds Building, Cheyenne.

CANADIAN OFFICIALS AND ORGANIZATIONS

Advisory Board on Wild-life Protection (Interdepartmental), Ottawa, Ontario. (Advises in the administration of the Northwest game act and the migratory-birds convention act, and also advises the Dominion Government on questions affecting the conservation of wild life generally; assists Provincial governments whenever possible and promotes cooperative measures between governments.)
Chairman, James White, technical adviser, Department of Justice.
Secretary, Hoyes Lloyd, Canadian National Parks, Department of the Interior.
R. M. Anderson, Geological Survey, Department of Mines; J. B. Harkin, Canadian National Parks, Department of the Interior; D. C. Scott, Department of Indian Affairs; J. A. Rodd, superintendent of fish culture, Department of Marine and Fisheries; C. Starnes, commissioner, Royal Canadian Mounted Police; Arthur Gibson, Dominion entomologist, Department of Agriculture; O. S. Finnie, director, Northwest Territories Branch, Department of the Interior.

Canadian National Parks, Department of the Interior, Ottawa. (Administers the migratory-birds convention act.)
Commissioner, J. B. Harkin.
Supervisor of wild-life protection, Hoyes Lloyd.
District chief Federal migratory-bird officers: Maritime Provinces, R. W. Tufts, Wolfville, Nova Scotia; Ontario and Quebec, Harrison F. Lewis, Canadian National Parks, Ottawa, Ontario; Western Provinces, J. A. Munro, Okanagan Landing, British Columbia.
Publications: Migratory-birds convention act and regulations; pamphlets.

Canadian Society for the Protection of Birds (Inc.).
President, J. A. C. Cameron, 102 Binscarth Road, Rosedale, Toronto.
Secretary, Laura B. Durand, Highways Building, 110 University Avenue, Toronto.

Jack Miner League.
President, Sam Harris, Toronto, Ontario.
Secretary, Edward R. Kerr, Walkerville, Ontario.

PROVINCIAL OFFICIALS AND ORGANIZATIONS

ALBERTA

Department of Agriculture, Edmonton. (Has jurisdiction over matters pertaining to game.)
Minister, George Hoadley.
Deputy minister, H. A. Craig.
Game commissioner, Benjamin Lawton.
Publications: Game laws; annual reports; bulletins.

Northern Alberta Game and Fish Protective League.
President, E. P. Hall, McLeod Building, Edmonton.
Secretary, N. R. Lindsay, Canada Permanent Building, Edmonton.

Southern Alberta Game and Fish Protective League.
President, Fred J. Green, Calgary.
Secretary, Austin de B. Winter, Canada Life Building, Calgary.

BRITISH COLUMBIA

Game Conservation Board, Courthouse, Victoria. (The game department is under the superintendent of provincial police, who becomes also ex officio provincial game warden.)
Chairman, M. B. Jackson, Victoria.
Secretary, F. R. Butler, Victoria.
Provincial game warden, J. H. McMullin, Victoria.
M. Furber, Victoria.
T. B. Booth, Nanaimo.
J. A. Buckham, Golden.
Allan Brooks, Okanagan Landing.
Joseph Murray, Vanderhoof.
F. O. McSwech, New Westminster.
H. F. Kergin, Alice Arm.
Publications: Game laws; bulletins; annual game report.

British Columbia Fish and Game Protective Association.
President, V. B. Harrison, Nanaimo.
Secretary, C. J. White, Box 523, Vancouver.

MANITOBA

Department of Agriculture and Immigration, Winnipeg. (Has jurisdiction over matters pertaining to game.)
Minister, Albert Prefontaine.
Chief game commissioner, J. H. Evans.
Publications: Game protection act; annual reports.

Manitoba Game Protective League.
President, H. J. Merkeley, 611 Medical Arts Building, Winnipeg.
Honorary Secretary-treasurer, B. M. Armstrong, 200 Standard Bank Building, Winnipeg.

NEW BRUNSWICK

Crown Land Department, Fredericton. (Has jurisdiction over matters pertaining to game.)
Minister lands and mines, C. D. Richards.
Deputy minister lands and mines, G. H. Prince.
Chief game and fire warden, H. H. Ritchie.
Publications: Game laws; annual reports.

New Brunswick Fish and Game Protective Association.
President, Allan G. McAvity, St. John.
Secretary, Francis Kerr, St. John.

NORTHWEST TERRITORIES

Northwest Territories and Yukon Branch, Department of the Interior, Ottawa, Ontario. (Administers the Northwest game act.)
Director, O. S. Finnie.
Chief of wild-life division, Maxwell Graham.
Publications: Northwest game act; reports of royal commission on possibilities of reindeer and musk-ox industries in northern Canada; Observations in the Wood Buffalo Park, 1922; pamphlets and posters translated into syllabic and Eskimo language.

NOVA SCOTIA

Department of Lands and Forests.
Minister, William Lorimer Hall, Halifax.
Publications: Game laws; annual reports.

Nova Scotia Guides' Association.
President, B. H. Annis, Hebron.
Secretary and treasurer, G. H. Allen, Yarmouth.

ONTARIO

Department of Game and Fisheries, Parliament Building, Toronto.
Minister, Charles McCrea.
Deputy minister, D. McDonald.
Superintendent, George H. Rapsey.
Publications: Game laws; annual reports.

Ontario Forest, Fish, and Game Protective Association.
President, ————.
Secretary-treasurer, A. Kelly Evans, Toronto Club, Toronto.

Ontario Hunters' Game and Fish Protective Association.
President, W. J. Moody, Kitchener.
Secretary, J. C. Richardson, 58 Playter Boulevard, Toronto.

**Ontario Sportmen's Game and Fish Protective Association.*
President, Sam Harris, 113 Sterling Road, Toronto.
Secretary, George A. Lister, 115 Sterling Road, Toronto.

PRINCE EDWARD ISLAND

Department of Agriculture.
Acting minister, James D. Stewart, Charlottetown. (Game inspector, Albert E. Morrison, Charlottetown, and constables, policemen, and market clerks enforce the game act.)
Publications: Annual reports.

Prince Edward Island Game and Fish Protective Association (Inc.).
President, Gil. Gaudet, Charlottetown.
Secretary, J. F. Fraser, Charlottetown.

QUEBEC

Department of Colonization, Mines, and Fisheries—Fisheries and Game Branch, Quebec.
Minister, J. E. Perrault.
Deputy minister, L. A. Richard.
Special (expert) officer, E. T. D. Chambers.
General superintendent of fisheries and game, J. A. Bellisle.
Assistant superintendent of fisheries and game, Eug. Hamel.
Publications: Fish and game laws; annual reports.

Province of Quebec Association for the Protection of Fish and Game.
President, C. G. Coristine, Montreal.
Secretary, J. R. Innes, 286 St. James Street, Imperial Bank Building, Montreal.

Province of Quebec Society for the Protection of Birds.
President, Napier Smith, 4026 Wellington Street, Montreal.
Corresponding secretary, W. S. Hart, Box 1185, Montreal.

Sportsmen's Fish and Game Protective Association of the Province of Quebec, Inc.
President, John S. Thom, 23 Ramparts, Quebec.
Secretary, Charles Fremont, 71 St. Peter Street, Quebec.

SASKATCHEWAN

Department of Agriculture, Regina. (Has jurisdiction over matters pertaining to game.)
Minister of agriculture, C. M. Hamilton.
Deputy minister, F. H. Auld.
Game commissioner, Fred Bradshaw.
Publications: Annual reports.

Saskatchewan Fish and Game Protective Association.
President, F. A. Blain, Saskatoon.
Secretary, A. E. Etter, Saskatoon.

YUKON

[For information regarding game laws, address Percy Reid, Gold Commissioner, Dawson.]

NEWFOUNDLAND

Game and Inland Fisheries Board, St. Johns.
President, ex-officio minister of marine and fisheries.
Vice president, Thomas Winter.
Assistant vice president, W. H. Rennie.
Secretary, Gower Rabbitts.
Publications: Game laws; annual reports.

MEXICO

Secretaria de Agricultura y Fomenta—Dirección Forestal y de Caza y Pesca.
Director Ynge. Alfonzo Magallón, Filomeno Mata N° 4.
In charge of game, Carlos López, 11a Tonalá 194, City of Mexico.

This publication is a contribution from

Bureau of Biological Survey—— Paul G. Redington, *Chief.*
Division of Migratory-Bird Treaty and Lacey Acts Enforcement—— H. P. Sheldon, *Chief United States Game Warden, in Charge.*

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UNITED STATES
DEPARTMENT OF AGRICULTURE

Miscellaneous Publication No. 7 January, 1928

BREAD or BARBERRIES

DON'T LET IT LIVE NEAR ENOUGH TO THROTTLE YOUR WHEAT.

U. S. GOVERNMENT PRINTING OFFICE: 1928

THE COMMON BARBERRY bush has been known to man for more than 2,000 years. For years men looked upon the common barberry as a friend, but to-day it is known to be an enemy.

It starts and spreads the enormously destructive black stem rust of wheat, oats, barley, rye, and many grasses.

Every year black stem rust destroys millions of bushels of wheat, oats, barley, and rye. Some years this disease is so severe that some crops are not worth harvesting.

When the crops are rusted there is less feed for our animals, less wheat for milling, and less bread for us all.

Stem rust starts each spring as tiny, yellowish spots on the leaves of the common barberry. Each of these spots produces thousands of spores, which are carried by the winds to the grain plants and start the rust on them. The rust takes the food from the grain plants, making them weak and sick and unable to produce big, plump kernels.

In 1918 the United States Department of Agriculture, in cooperation with the 13 States of Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming, began a campaign to destroy every common barberry bush in these States. Millions of bushes have been found and killed, but millions still remain to spread destruction to the grain crops.

Because these bushes are difficult to find, and because boys and girls have such keen eyes and love to roam through fields and woods and along streams where barberries may be growing, the United States Department of Agriculture is asking every boy and girl to help in this great fight against the common barberry.

Washington, D. C. January, 1928

BREAD OR BARBERRIES

By Edith M. Patch

Collaborator, United States Department of Agriculture, and Entomologist, Maine Agricultural Experiment Station

A PLANT WITH TWO HOMES

SWALLOWS and many other birds live in warm countries in the winter and then fly to the north where they build their nests and bring up their young in the summer. Salmon and eels and some other fishes live part of the time in the salt sea water and part of the time in fresh-water streams and ponds. There are kinds of insects that stay for a while on the leaves of trees and live during the rest of the year on the roots of plants in the ground.

These birds and fishes and insects are not the only living things that have a habit of leaving one kind of home and moving to another when they need a change. Some plants spend part of their lives in one place and part in another and altogether different sort of home. One kind of plant lives for a while each year on barberry bushes and the rest of the time on plants belonging to the grass family, such as wheat, oats, barley, and rye, and many other grasses. The plant that does this is one kind of fungus.

A FUNGUS

Perhaps the kind of fungus you know best you call a toadstool because it is shaped like a little stool and is about the right size for a toad. If you cut off the top of a toadstool and place it on a piece of paper, the paper under it will soon be covered with something that looks like the finest sort of dust. The dustlike particles are called spores, and, although they are very tiny, they contain life, as seeds do, and they can grow into toadstools.

If you kick a kind of fungus that is called a puffball, the spores, if they are ripe, come puffing out in a dark cloud and are blown about by the wind. Such of these spores as fall in the right sort of place germinate and grow into puffballs.

The fungus that lives part of the time on the common barberry bushes and part of the time on wheat or other plants of the grass family has one kind of spores that are reddish like the color of iron rust. For that reason it is called a rust. A rust is a queer sort of plant that has different stages in its life and each stage has ways and habits of its own.

These stages in the life of the rust are (1) the colorless stage, (2) the yellow or cluster-cup stage, (3) the red or summer stage, and (4) the black or winter stage.

THE LIFE STORY OF A RUST

In the spring, when plants begin to grow, there is a little visitor that comes and makes itself at home on a barberry leaf. This tiny visitor is a rust spore of the first stage of stem rust. This spore, like many more of its kind, has just been produced by the black spores of the rust which have rested through the winter on stubble and old straw. (Fig. 1.)

This tiny spore rests on the leaf and takes a bath in a raindrop or in dew. When it has soaked for a few hours it sprouts, and a little rootlike tube called a *hypha* pushes out of it and reaches into the barberry leaf. It sucks food out of the inside of the leaf, and grows into a rust plant. In order to be healthy the barberry leaf needs this food for itself. So, while the rust plant is growing strong, the barberry leaf becomes weak and sick.

Such a starved, sick barberry leaf soon has a yellowish spot on top and some little yellowish cup-shaped growths on the underside. This is the second stage of the rust. These growths lie close together in clusters and are called cluster cups. (Fig. 2.) They are filled with yellow spores that grow in rows like beads in a chain. When they are ripe these spores are shot out into the air like smoke from a gun, and the wind lifts and carries them as it does smoke.

The spores that are shot out of the cluster cups can not grow on a barberry leaf. This seems very strange, as the barberry leaf has the right sort of food for the cluster cups themselves.

The habit of these yellow spores that come out of the cluster cups is to live on plants that belong to the grass family, and not on any other kind. Such of the spores as are blown to barberry bushes or oak trees or potatoes or anything in the world except some kind of grass can not grow into rust plants, but die while they are spores. But there are thousands and thousands of spores that, in tiny clouds, come puffing out of the cluster cups, and many of them are brought to wild or cultivated grasses. If there are any wheat plants growing in the neighborhood of a barberry bush, they are sure to be dusted with spores that are blown over from the cluster cups.

When one of these spores comes to rest on a wheat stem or leaf, and soaks for four or five hours in a drop of rain or dew, it starts to grow. It sends out a little tube or hypha that grows along the outside of the stem until it comes to a breathing pore. Then it grows into the pore, and helps itself to the food in the inside of the wheat plant. Of course the wheat plant needs this food, and, if there are many rust plants growing on it and stealing its food, it becomes weak and sick. After a spore starts its hypha into the wheat it takes about a week or 10 days for the fungus to grow into a rust plant old enough to produce more ripe spores. These spores grow in little spots called *pustules*.

A sick wheat plant soon looks as if it had little blisterlike pustules all over its body—on its stems and leaves. In a few days these pustules open. They are filled with ripe spores which are rusty red in color. (Fig. 3.) This is the third stage of stem rust and is known as the red stage.

These red spores blow to other wheat plants, and the same thing happens. So, about once every 10 days, there is a fresh crop of red

spores ready to blow from sick, rusty wheat to healthy wheat, which in turn becomes rusty and weak. Before the wheat ripens there may not be a single healthy wheat plant in the whole field.

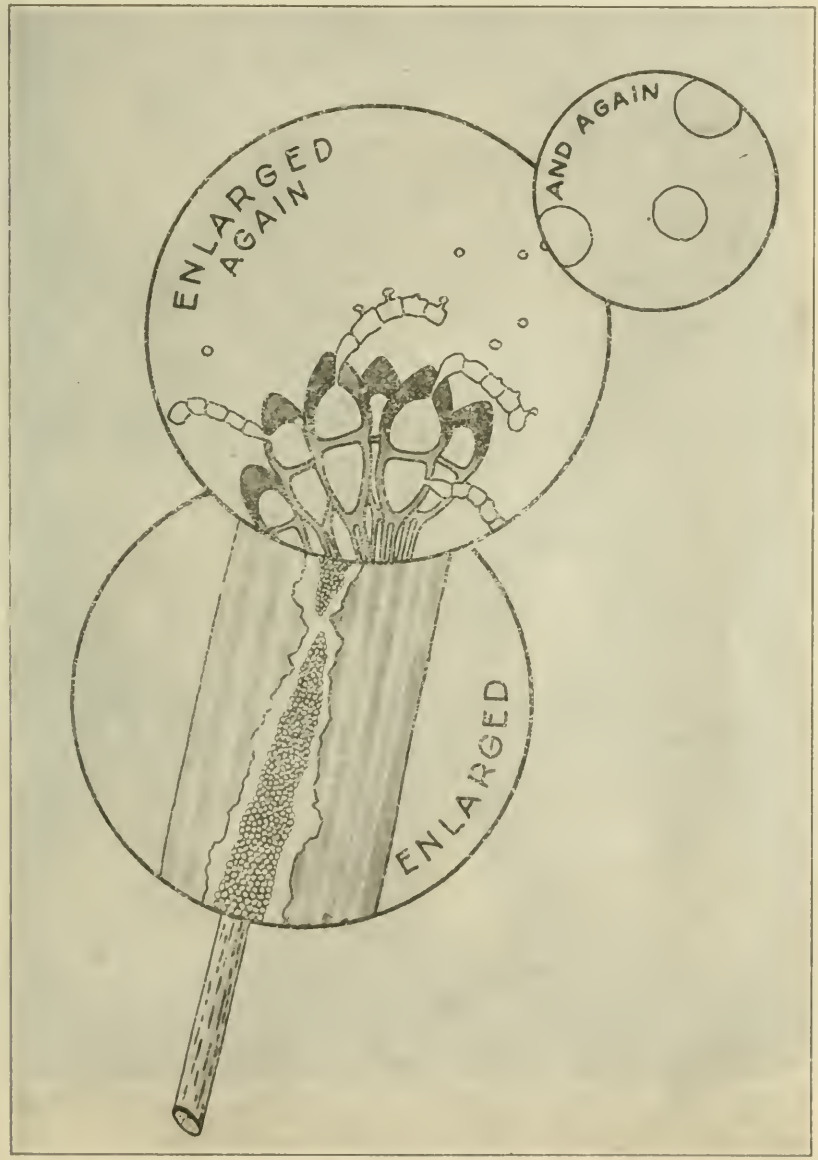

FIG. 1.—A piece of wheat straw with pustules filled with black spores which have lived through the winter. The middle circle shows how these black spores produce the transparent spores which cause rust on the barberry

Instead of having big, plump kernels as healthy wheat plants do, the sick plants have shrunken grain that is not fit for making flour. Thus the rust steals our bread by making the wheat plant too weak to have good seeds.

You now know about three stages of the rust—the colorless stage which is produced by the black stage, the yellow cluster-cup stage on barberry leaves in the spring, and the red stage on wheat (or

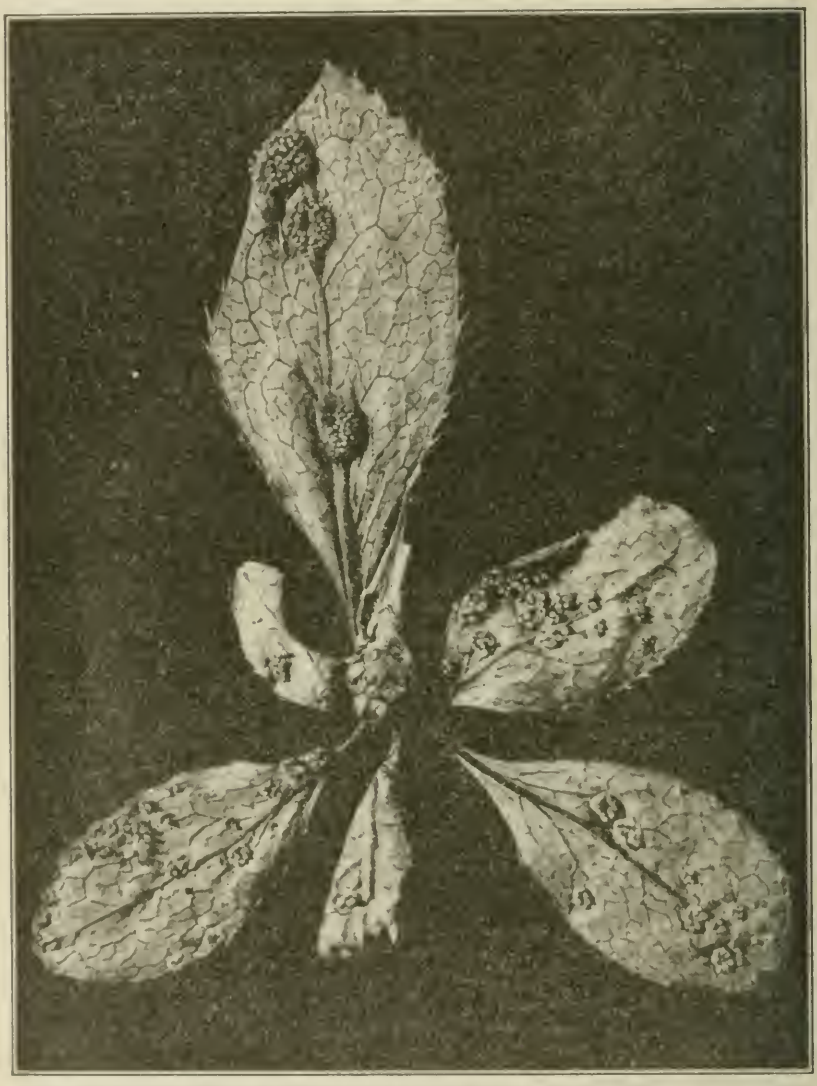

FIG. 2.—In the spring the rust forms groups of cluster cups on the leaves of the common barberry. These cluster cups are filled with thousands of spores which are carried by the winds to wheat and other grains or to grasses

other grains or grasses) in the summer. After the red stage, there comes a fourth or black stage.

As the grain begins to ripen, pustules filled with black spores appear. (Fig. 4.) Because of these black pustules the rust then is called black stem rust, although it is the same rust.

The black spores stay quiet and unchanged all through the fall and winter in the pustules on the dry stems of wheat and other grasses. They sometimes are called resting spores because of this habit.

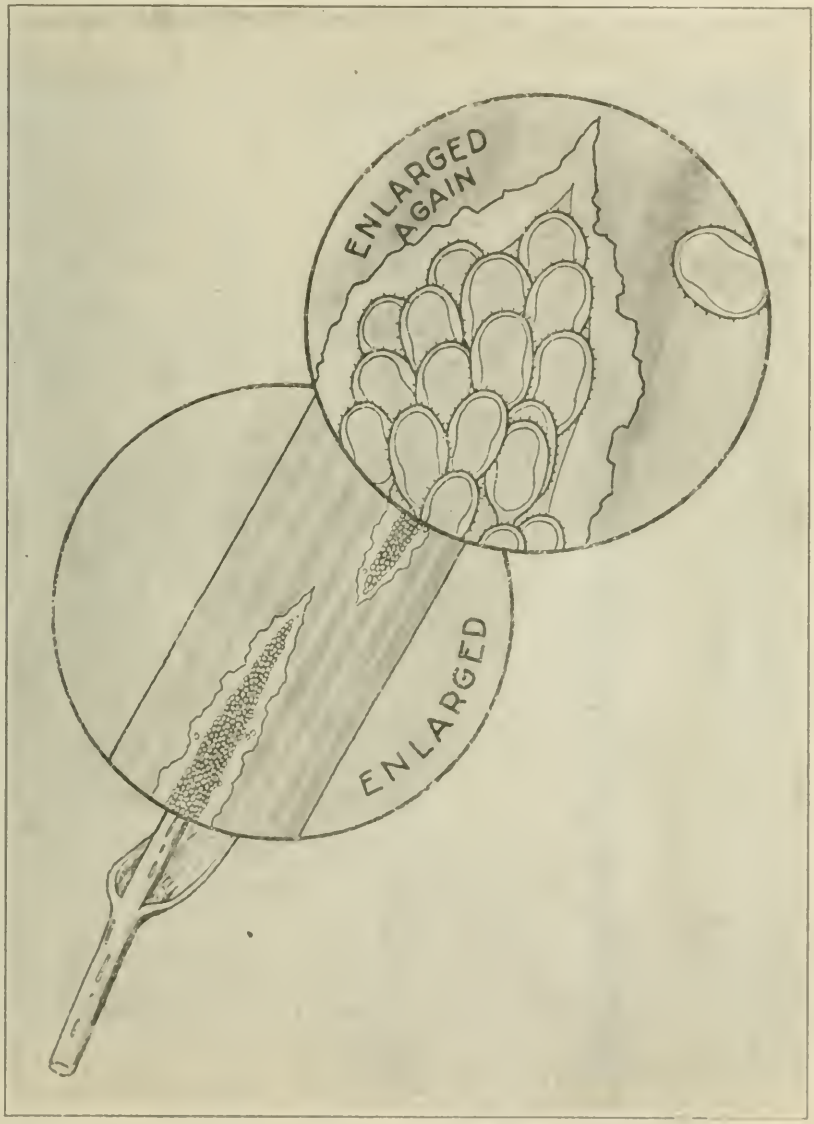

FIG. 3.—A piece of wheat stem with red rust pustules. The lower circle shows parts of two pustules enlarged. In the upper circle a few of the red or summer spores which fill these pustules are greatly magnified

In the spring, when the soaking rains come, the black spores swell. Each cell of a black spore then pushes out a slender white thread or hypha. Each hypha bears only four spores. (Fig. 1.) These are so few and so tiny and colorless that they are not seen by the naked

eye. These bring us again to the first stage of the stem rust. Although tiny and nearly invisible, these spores are a most important link in the life of the rust. For it is in this stage that the rust leaves the dry, dead wheat stem and finds its way, by the help of the wind or any chance breeze, to a fresh new barberry leaf in the spring. There it settles and, sending its hypha or tube into the leaf, takes for itself the food that is inside. Thus it grows until it forms the cluster cups we talked about before.

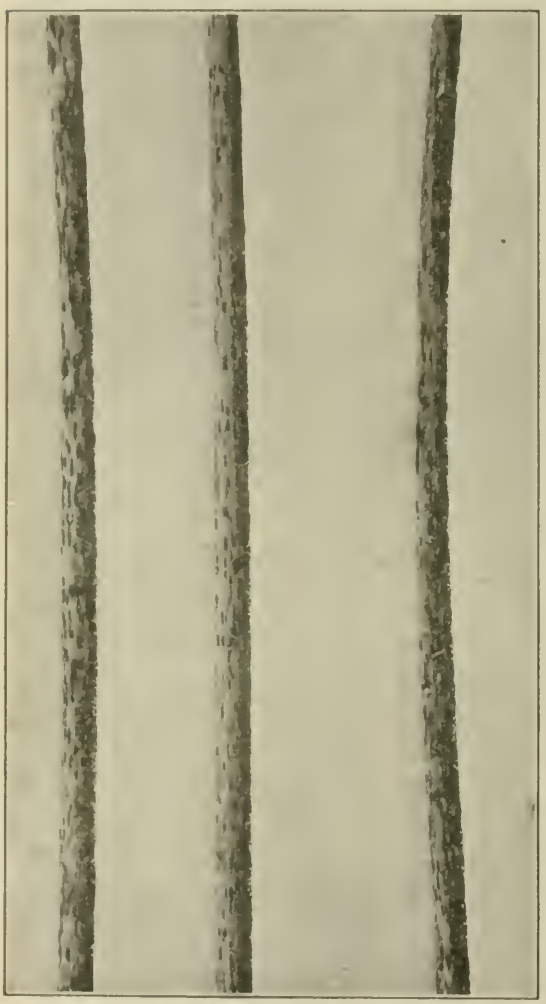

FIG. 4.—As the grain begins to ripen, the rust pustules become filled with black spores

THE COMMON BARBERRY

The common barberry (fig. 5) has been so interesting to people that something is known of its history for more than 2,000 years. For many centuries people liked to have the barberry growing in their yards and gardens and fields. When they moved they took seeds or young bushes with them to their new homes. Travelers carried the seeds from country to country. Men looked upon the barberry as a friend.

Nowadays people who understand what sort of neighbor the barberry is do not wish to see it growing. Instead of cherishing it, they kill it. In many places they make laws which forbid the planting of this bush and laws to provide for getting rid of it in places where it is growing. They look upon the barberry as an enemy.

The history of the barberry in different places helps us to understand both the old-time and the present-day feeling about this shrub.

The common barberry still lives wild among the mountains in Asia. We know that it was growing in that part of the world more than 2,500 years ago because of what the old Hindu writers wrote

about it. In those days doctors used parts of the barberry in making medicine. Indeed, it seems to have been because of its use in medicine that the barberry was brought out of Asia into countries where it had not grown before. Little by little this bush was taken into all the countries of Europe. In most of these countries doctors used

FIG. 5.—A bush of common barberry. It sprouts stem rust to wheat and other grains. Report every one to your State agricultural college

to steep barberry leaves or bark or roots and give this old-fashioned medicine to people who were sick.

Once people made their own dyes and inks. From the inner bark of the barberry they made yellow dye. By adding certain materials to this dye they made green dye. They found that by treating the juice from the barberry plant with alum they could make red ink.

The wood of common barberry is strong, and in the old days men used it in making certain small articles such as teeth for rakes.

The tender leaves in spring are sour, and some people ate them for salad, as sorrel leaves have sometimes been used. The sour juice of the fruit was pressed out and used in many ways, as lemon juice is now used, for flavoring some kinds of drinks and foods. It was used also for making vinegar. The fruit, cooked with molasses or sugar, made jam and jelly. It is no hardship now to spare the barberry from our tables, because there is plenty of other fruit for jelly and jam and vinegar, and there are such agreeable drinks as lemonade and grape juice and raspberry shrub.

Long ago, in the days before the first wire fences were made, when farmers wished to separate one field from another, they planted hedges. Of all the bushes they used in this way, the barberry was the favorite because the many stems made a thick hedge, and the thorns kept men and animals from breaking through. It was many years before farmers learned why their grain crops did not grow well near such hedges.

The barberry was pleasant to look at. The poet Lowell wrote:

> All down the loose-walled lanes in archin' bowers
> The barb'ry droops its strings o' golden flowers.

It was not in springtime only that people enjoyed the barberry. The bunches of red berries were attractive when they were ripe, and so were the autumn colors of the leaves. Such beauty, however, belonged only to a healthy bush. A barberry sick with rust and covered with cluster cups was not a pretty sight.

So we find that there have been, at one time and another, several reasons for liking the barberry bush. Some of these reasons explain why people who came to America from England and Germany and Sweden brought the barberry with them and planted it in a land where it had never grown before. In the same way, people moving westward from New England took the barberry with them to other parts of the United States.

The one big important reason for considering the barberry an enemy overshadows all the little reasons there once were for considering it a friend. This reason is that, in the great northern wheat regions of this country, the common barberry is the plant from which the black stem rust spreads to grasses and grains, including wheat.

After a deed has been done, it often is easy to look back and say whether it was well to do it. We know now that it was a terrible mistake to bring such a pest as the barberry to America. Even after it had been planted in New England, it should have been killed instead of being carried westward. This mistake that was made is costing our country great fortunes every year, for the barberry (because it scatters the spores of the destructive rust) is the worst enemy of our most important food crop—wheat.

WHEAT IS IN DANGER

Wheat has been grown as a grain crop for more than 5,000 years, perhaps for more than 10,000 years. Who or where the people were who first sowed wheat in little gardens no one knows, because it was so long ago. But there are reasons to think that the first large wheat farms may have been in Asia on fertile land between the Tigris and the Euphrates Rivers. On the ancient tombs in Egypt there are pictures which show how people sowed wheat about 6,000 years ago.

There is a story that the first wheat seeds sown in America were a few grains which one of Cortez's slaves found mixed with some rice which had been brought from Spain. It is said that all the wheat crops of Mexico started from the seeds saved and grown by that one careful slave about 400 years ago.

In the United States the first wheat is thought to have been sown on the Elizabeth Islands off the coast of Massachusetts about three and a quarter centuries ago. Later wheat was grown in Virginia. George Washington owned what were in his time the largest wheat fields in America, and there was no better flour made in the world than the Mount Vernon brand.

For many good reasons wheat always has been a pioneer crop. It grows well on new land. It can be carried great distances and kept for a long time without spoiling. Millions of people need it for food,

FIG. 6.—A field of wheat that has not been rusted. This is the kind of wheat our millers need in order to make good flour

so it is easy to sell it. As families moved westward from New England into New York and Ohio and then farther on to Wisconsin, Minnesota, and other parts of the Middle West, wheat often was the first crop grown after the land was plowed. Later wheat was sown on the newly broken land in the Pacific Coast States. Over much of this great area wheat still is the most important crop. (Fig. 6.)

For the people who grow wheat there is much toil and cost and anxiety. The labor of plowing and cultivating the ground, the task of sowing the seed, the long weeks of waiting while the wheat grows, the uncertainty about weather conditions—all these experiences must come before there is a chance for a harvest.

It is not strange, therefore, that when the grain is ripe men rejoice to hear the noise of the reapers or binders or the combined harvester-thresher giant moving across the great western wheat farms. Some

of these marvelous machines, as the name harvester-thresher suggests, cut the grain and thresh it at the same time, pouring the clean wheat into sacks or wagons. Such a machine, drawn through the field by as many as 32 horses or a giant tractor, can cut and sack the grain from 50 acres in a day.

To see one of these monsters move its dusty way across a field of grain, to watch the steady march of a binder through a field of golden wheat, is to take one's thoughts a long way from the swish of scythes and the beating of flails—the tools of harvesting and threshing of the long ago.

Fig. 7.—The shriveled wheat kernels were produced by rusted wheat plants. The plump wheat kernels were produced by healthy wheat plants

Great as are the changes in the ways of harvesting, the harvest itself causes happiness to-day, as it has during all the thousands of years since the first harvest of all.

In England, when the old-time harvesters brought home the last sheaves of the season, some of the girls, in bright dresses, rode in the carts, and the other reapers danced to the music of pipes and sang:

We have plowed, we have sowed,
We have reaped, we have mowed,
We have brought home every load,
Hip, hip, hip, harvest home!

A good harvest is so important to people that for centuries in many lands it has been thought fitting to celebrate the close of the season in some happy manner such as a "feast of the ingathering at the end of the year." Our own national harvest festival is the legal holiday known as Thanksgiving Day.

All this rejoicing rests on the welfare of the frail grasslike grain plants. If the plants are healthy, the crop is good. If the plants are sick, they produce shrunken or worthless kernels. (Fig. 7.) Thus we can understand that the time of harvest may be the saddest season of the year instead of the gladdest. If the grain is a failure, all the

work and the cost of the crop and all the waiting and hoping have gone for nothing. Instead of feasting, there is hunger.

There have been many such grievous harvests in many lands, for often the wheat would sicken and be unable to grow kernels fit for flour. Long ago such sickness of the wheat was called mildew. In ancient days the Romans held a festival in April and offered sacrifices with a ceremony that they hoped would protect their fields from mildew. In one of Shakespeare's plays we read that "The foul fiend Flibbertigibbet mildews the white wheat."

We have this same disease of wheat in America. We do not call it mildew now. We call it black stem rust, the fungus which lives part of its life on the barberry from which it spreads to grasses and grains.

Every year some areas of wheat (and such other valuable grains as oats, barley, and rye) are stricken with black stem rust. For a long time now this dreadful disease has ruined millions of bushels of wheat in the United States every year. One year, during the World War, when the farmers were trying to grow more wheat than usual to make bread for the soldiers, there was an epidemic of this terrible rust of wheat which destroyed hundreds of millions of bushels.

This situation is serious for the grain farmers. Indeed, some farmers have become discouraged about growing wheat because it is so likely to be spoiled by the rust.

If less wheat is harvested, fewer plows and harrows and seeders and reapers will be needed, and there will be less work for the men who make such farm machinery.

If less wheat is harvested, fewer trains and ships will be needed to carry the crop from the fields to the mills; and, of course, there will be less work for men on trains and ships.

If less wheat comes to the mills, what will that mean to the millers and other people in such great milling centers as Minneapolis, where now hundreds of thousands of barrels of flour are ground each week?

If less flour comes out of the mills, less cotton will be needed for cloth sacks and less lumber for barrels and less pulpwood for paper bags and boxes, and so the cotton grower and the lumberman will suffer.

Thus you can see that it is not the farmer alone who has a fearful enemy in the barberry that carries the rust with its spores blowing over his wheat fields. Indeed, you might try to see if you can think of any business that is not somehow affected by the wheat crop and by the welfare of the people who work, directly or indirectly, with wheat.

Of course you do not need to be reminded that less flour means less bread and muffins and macaroni and cookies and cakes and pies. You may be surprised, however, to learn how many other foods need flour to make them good. A cookbook in common use in the United States during the past 30 years contains more than 1,000 recipes that call for the use of flour or of something made with flour. Many a dish of meat or vegetables is better to taste and to look at, as well as better in food value, because it has been rolled in bread crumbs or thickened with flour or served on toast or otherwise combined with the ground powder of the wheat seed.

The grave danger which threatens our food supply and business of many sorts would be unspeakably terrifying if there were nothing

we could do to save the wheat. Fortunately, however, there is one thing we can do. We can control the rust in the Northern States by destroying the common barberry.

Farmers in England and in certain countries of continental Europe started the fight against the barberry many years ago. Some of them saw that when the winds blew across the barberry hedges and then over their grainfields the grain on that side of the hedge would be blighted with rust. So they dug out the hedges and watched their grain, and found, in the following year, that the plants were healthy and the kernels plump and sound. But taking out hedges was not enough to cure some fields, because most of the rich landlords had barberry bushes in their grounds and the grain nearest such bushes would be blighted when the weather was warm and moist. The farmers asked the landlords to dig out their barberry bushes, and some of the landlords did; but others thought it a silly notion that a barberry bush could harm a grainfield, so they refused. Then the farmers went away angry and came back again in the dark with axes and chopped out the barberry bushes, or they brought kettles of scalding water and killed them that way. They were desperate because they and their families would starve if they could not grow good grain.

It was a bitter and angry sort of fight because no one understood just what the cause of the trouble was. The farmers found that they could not grow good grain near barberry bushes, but they did not know why. So they tried to think of a reason. Some of them said that the barberry blossoms blighted the wheat. Others said the breath of the bushes spoiled their grain. Such explanations seemed silly to people who liked the barberry bushes. Of course you know that was in the days when people were very ignorant about the growth and habits of plants. But they were not dull. They knew by watching and trying that grain would be spoiled if barberry bushes were growing near, and that if they took away the barberries they could have good grain. So they kept fighting the barberry (and sometimes the men who planted it) even when they were laughed at.

As the knowledge of science increased, the plant doctors began to study the cluster-cup rust on the barberry to see if it really could have anything to do with the rust that looked so different on the wheat. And so it happens now that no one laughs at those sturdy old farmers for insisting that the barberry was to blame for the rusted grain crops. For, when the scientists found why the barberry was a bad neighbor for a wheat field, as you learned at the beginning of this story, they were ready to stand by the farmers and join the war against the barberries.

Nowadays there is no mystery about the barberry story. We know that the spores from the cluster cups on the barberry bushes blow for miles across the grainfields, doing dreadful damage all the way. And knowing this, we know, of course, how to prevent such damage. To cure the wheat of black stem rust in all parts of the world where the winters are cold enough to kill the summer or red stage of the rust, the only thing that need be done is to get rid of the barberry bushes on which the cluster cups grow in the spring. That is exactly what the farmers in England did years ago. More recently, that is what the people of Denmark and some other European countries have done. And everywhere the result is the same: No barberry bushes and good crops of grain!

In the United States, the hardest struggle against the barberry is going on in that part of the country where the loss of wheat has been greatest. This battlefield covers an area more than 1,500 miles long and 700 miles wide. In it are the States of Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming.

The people who have been doing the fighting are workers from the United States Department of Agriculture, the State colleges of agriculture, the State departments of agriculture, farmers, business men, nurserymen, newspapermen, teachers, and many others.

Millions and millions of barberry bushes have been found and killed, but unknown thousands of bushes have still escaped capture. Big bushes in dooryards and hedgerows and along roadsides are easy to find, but small bushes miles away in the woods or in unused fields, or lost among taller plants or hidden in some river-bank shelter, are hard, very hard, to find. It is in such far-away places that barberry seeds have been scattered by birds and other animals during a hundred years and more. Hunting for the smallest escaped or "wild" bushes seems like hunting for needles in haystacks.

But there is a zest in hunting that boys and girls like. Their eyes are keen, and they spend much time roaming through fields and woods and climbing banks. So it is not hard to guess why boys and girls are being asked to join in the great hunt for barberry bushes. They are asked to help protect the food for the army of wheat eaters. Scouts are needed for the barberry battle—boy scouts, girl scouts, boys and girls belonging to the 4–H clubs, and boys and girls belonging to no clubs at all.

In fact, help is needed from anyone, young or old, who will do these three things: (1) Learn to know the harmful common barberry and the harmless Japanese barberry; (2) send a sample of any bush you think is a common barberry to your State agricultural college; and (3) tell this story to anybody you find who does not understand about the common barberry and why we should kill it. Let us repeat these three things so we will not forget:

1. Learn to know the harmful common barberry. It has leaves with bristle-toothed edges, gray bark, blossoms in clusters, red berries in bunches, and spines usually in threes. (Fig. 8.) Learn to know the harmless Japanese barberry. It has smooth-edged leaves, brown bark, blossoms and berries singly or in twos, and spines usually single. Japanese barberries have been planted in many yards for ornament, and they do no harm to grain because the rust can not live on them.

2. If you find a common barberry bush growing in any one of the 13 States where the barberry battle is going on, mark the place where you find it. Then cut off a sample (to prove that you know a barberry bush) and send it to the agricultural college of that State with your name and address and a letter telling where you collected the sample. The news you send will help the people in charge of the work to locate the bushes and see that they are destroyed.

3. If you know any person who does not understand why we are fighting the barberry, tell him what you have learned about the life of the black stem rust, or let him read this publication. Even if you are not living in or near any of the 13 States where the barberry battle is raging, you can help. For we must remember that the

trouble all began because people who did not understand what a dreadful thing they were doing planted barberries in new places. So, wherever you live, you can help keep the grass in the nearest meadows or pastures healthy and the grain in the nearest fields in good condition by not allowing any common barberry bushes in your yard, and by telling other people what you know about these pests.

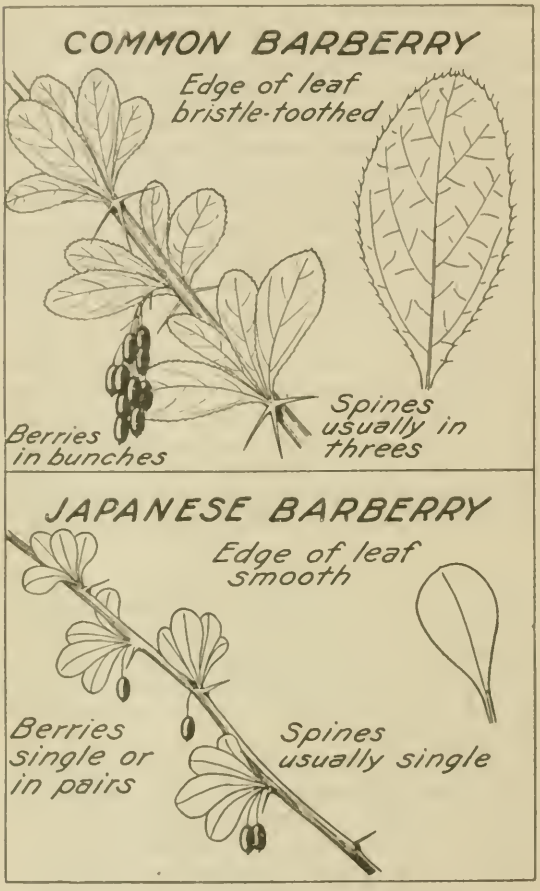

FIG. 8.—Learn to know the common barberry from the harmless Japanese barberry

THE CALL FOR VOLUNTEERS

It is because the older workers have found it a longer, harder battle to kill all the barberries than they at first thought it would be, that they are asking for young volunteers to help them.

If your eyes are keen enough to find a seedling barberry that other volunteers have passed by, enlist as a scout for spying the hidden enemy of wheat.

Choose a captain for your company. Challenge a company from a neighboring school or town to find more barberries in a week or a month than your company can.

Select for your company some bright color, as red or blue or green or yellow, and tie a strip of colored cloth or bit of colored string to every barberry bush you find. Then other volunteers passing that way will know what company has been there before them.

But there is no need to tell you how to do your fighting! If you are patriot enough to join in the great battle to protect wheat and barley and oats and rye, you will think of plenty of ways of winning an exciting and glorious victory.

If you need a slogan, you might try "Bread or Barberries," unless you can think of a better one. And for a manual you may have, if you like, this publication, which is dedicated to the Defenders of Bread.

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MISCELLANEOUS PUBLICATION NO. 8
UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C., SEPTEMBER, 1927

A Review of Five Years of Fact Organization and State and Regional Program Making in the Western States,[1] and a Report of the 1927 Extension Conference

W. A. LLOYD
Regional Agent in Charge, Western States, Office of Cooperative Extension Work

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FOREWORD

At the beginning of extension work the program of the county extension agent was largely predetermined. The Smith-Lever Act of 1914 was based on the idea that there existed a great body of results from experiment and research which, if applied to farm and home practices, would have a helpful influence on the farm business and the home life. It was the duty of the extension agent to show by concrete, visible demonstrations the methods of applying the results of scientific discovery to agricultural practices. The county extension agent, the college, and the department largely determined and were responsible for the things that were to be demonstrated. This phase of program development continued from 1904 to about 1916.

About 1916 program making passed into a second phase which lasted until 1922 and might be called the period of self-determined programs. The county extension agent, through farm organizations, committees, and group meetings, obtained from the farmers an expression of what work they desired and what they thought should be done. On the basis of this community expression, the extension agent organized his program and projects, worked out his plans, and appointed his leaders. This method of program development obtained a larger measure of sympathy and support from rural people. Projects tended to become more definite, and goals and objectives were set. Perhaps diffuseness was the greatest defect of this phase of program making. To a degree this method was modified or interrupted during the war when there existed for a brief period in most counties an artificial or emergency program, which was a part of the country's general organization for war. The two phases in program development, the predetermined and self-determined, had one characteristic in common. Both were concerned primarily with practices desirable for adoption in certain lines of production.

[1] This review, in slightly different form, was presented by the writer at the Western States Extension Conference, Reno, Nev., July 11, 1927.

RANGE-LIVESTOCK PROGRAM

1. CULL FEMALES. KEEP THE BEST FOR BREEDING.
2. HIGHER PERCENTAGE CALF AND LAMB CROP.
3. BETTER GRAZING METHODS.
4. RANCH BUSINESS RECORD KEEPING.
5. GRADING FOR MARKETING.

FIG. 1.—Portion of a poster displaying the important features of the Western States range-livestock extension program

During the agricultural depression that followed the war the problem appeared to be more a matter of what to produce, how much to produce, and where to produce it, rather than merely to improve productive processes. In this new field neither the State experiment stations nor the Federal Department of Agriculture had any considerable organized background of research upon which to base projects. Organized investigation in agricultural economics, marketing, and farm management is comparatively new.

About 1922 a third phase of extension program making began, which may be called a period of fact-determined programs. These differ fundamentally from the predetermined and self-determined types, since their objective is to affect the character, location, and size of farm enterprises rather than their interior processes. The making of such programs turned the attention of extension workers toward the field of agricultural economics, particularly farm management. Preliminary to a fact-determined extension program in any section there must necessarily be an assembly, organization, and interpretation of the available facts relating to the farming industry as a whole on either a regional or an enterprise basis, or both. Many

facts exist relating to the economic aspects of farming, but they have been developed by various organizations and by agencies of the State and Federal Governments. Before such facts can be particularly useful as a basis for extension program development they must be gathered together, coordinated, and studied. Often a special line of investigation must be undertaken and new facts developed before a safe or correct interpretation can be given. During the last five years the cooperative extension service in the Western States has functioned as an organization agency in this fact-determining procedure. Two general methods have been followed:

(1) One or more persons have been employed by either the extension service or the experiment station, who have devoted their time exclusively to the assembling and organization of these basic facts.

(2) Committees composed of representatives from both the State experiment station and the extension service have been appointed, usually on an enterprise or commodity basis, to assemble and publish all the facts available relating to that particular enterprise. These committees also have included in their membership the county extension agents, farmers, and sometimes representatives of commercial, banking, manufacturing, and transportation interests. After the facts have been assembled, organized, and published the second phase of the procedure has been their interpretation. This interpretation has been accomplished in group meetings, at which representatives of the State experiment station and the extension service met with a number of producers, analyzed carefully the facts presented, and usually recommended a production program. Such meetings have been held on both the enterprise and the area basis: that is, conferences have been held concerning such subjects as apples, wheat, poultry, and dairying, or to consider the facts relating to such areas as the Arkansas Valley in Colorado, or the Columbia River Basin, or single counties.

In fact-determined programs the improvement of enterprise processes is no less important than formerly. Now, however, these become the project phases to be considered in relation to the whole enterprise rather than as a unit of prime importance in themselves.

In these fact-determined programs extension workers and farm people seem to have found a sounder basis for projecting a scheme of extension activities. With the economic facts bearing on a farm enterprise or agricultural area thoroughly understood, farm organizations and extension workers should be in position to think out a long-time constructive extension program.

STATE AND COUNTY CONFERENCES

Fact organization as a basis for program development had its first important development in Oregon in 1922. A number of fact-organization committees were appointed by the extension service on an enterprise basis. Reports of these committees were formulated and adopted at a State economic conference. These were published as a single report and have furnished a general background for further fact organization on a county, regional, and enterprise basis. Nineteen counties in Oregon have held one-day or two-day fact-organization conferences, the college people and local farmers participating.

NUTRITION PROGRAM

1. "LIVE-AT-HOME" ADEQUATE HOME-GROWN FOOD SUPPLY.

2. HOME GARDENS.

3. ADEQUATE MILK SUPPLY, PARTICULARLY FOR CHILDREN.

4. POULTRY FLOCK FOR HOME USE.

5. CONSERVATION AND TIMELY DISTRIBUTION OF FARM MEAT SUPPLY.

6. A BALANCED FAMILY DIET FOR HEALTH, STRENGTH, AND EFFICIENCY.

FIG. 2.—Portion of a poster displaying the important features of the Western States nutrition program

In a few counties facts relating to the home have been considered by special committees. Their conclusions have been published in printed bulletins. Two conferences regarding irrigation projects have been held and the facts organized. Two enterprise conferences have been held for consideration and assembly of facts relating to particular commodities—wheat and prunes. Other county and regional conferences are to be held.

In Montana a State organization of facts has been developed and six area conferences held. In addition, two county fact-organization conferences have been held, and additional county conferences are scheduled for the fall of 1927. Montana is developing facts relating to home conditions and country life in connection with its agricul-

tural program. The fact-organization work began in Montana in 1922.

Colorado held a State conference in 1923, and a State program was published. Since then two area conferences involving the Arkansas and San Luis Valleys have been held. The facts relating to home conditions as a basis for a sound program in home economics were also organized in these area conferences. Plans have been made for two more regional conferences to be held during the summer of 1927.

Washington is proceeding on an enterprise basis looking to the holding of a state-wide conference after the more important enterprise studies have been completed. Up to the present time, wheat, dairy, poultry, forage crops, the more important fruits, and lettuce have been covered. A series of county conferences is now planned.

In California the statistical or fact organization has been done by the extension service and the experiment station in cooperation with organized producers' associations. The results have been presented through printed bulletins. Peaches, poultry, lettuce, and cantaloupes have already been covered.

In Idaho a State fact-organization conference has been held and the conclusions there reached are in process of publication. The Federal Department of Agriculture, the State department of agriculture, and the agricultural college cooperated in the development of the facts. An area conference on an irrigation project has since been held, and county conferences will be held during the summer and fall of 1927.

In Nevada a State conference has been held, also two county conferences involving an irrigation project. The proceedings are in progress of publication.

In New Mexico one fact-organization conference has been held in relation to the Rio Grande reclamation project, involving cooperation with the State of Texas and the Bureau of Agricultural Economics.

In Arizona fact-organization work is in its preliminary stage. Plans are in progress for holding a conference for the development of facts and a conference on the Salt River reclamation project.

Utah is making a definite study of one enterprise—apples—cooperating with the experiment station and the Federal Department of Agriculture, and is laying the basis for the appointment of institutional committees for its state-wide fact-organization work.

Wyoming is making plans for fact organization covering one of its important irrigation projects.

The exact procedure of these conferences has varied in different States but has been essentially as follows:

The extension service has generally assumed responsibility for the appointment of committees, organization of facts, holding of the conferences, and publishing of results. The experiment station and the Federal Department of Agriculture have participated. Farmers have participated, either through their cooperative organizations or as individuals. In many conferences manufacturers, bankers, processors, shippers, and other interested groups have taken part.

WESTERN STATES REGIONAL CONFERENCES

In addition to the effort within the several States, the Western States regional conference, since 1923, has been organized on a pro-

DAIRY PROGRAM

1. IMPROVEMENT IN QUALITY OF ANIMALS.
   - (a) COW-TESTING ASSOCIATIONS.
   - (b) PUREBRED BULLS.
   - (c) BULL ASSOCIATIONS
2. IMPROVEMENT IN FEED OF ANIMALS.
   - BETTER RATIONS.
3. IMPROVEMENT IN HEALTH OF ANIMALS.
   - CONTROL OF TUBERCULOSIS.
4. IMPROVEMENT IN MARKETING OF MILK.
   - CAMPAIGNS FOR IMPROVING QUALITY.

FIG. 3.—Portion of a poster displaying the important features of the Western States dairy-extension program

gram-development basis. At the regional conferences held at Fort Collins, Colo., in 1923, at Tucson, Ariz., in 1924, and at Pullman, Wash., in 1925, the subjects of range livestock, human nutrition, dairying, the major farm crops, farm management, and home management were covered. At the conference held at Reno, Nev., in July, 1927, poultry and clothing received regional consideration. With the exception of range livestock and dairying, comparatively little statistical organization on a regional basis has been done. The approach has been through a study of the project phases that have received emphasis in the various States. The plans of work and the results obtained in the various States have been studied carefully and selection made of the more important phases for regional emphasis. The programs that have come out of this series of regional

conferences have proved generally acceptable and provoked much favorable comment for their apparent economic soundness.

The salient features of the regional programs in the six extension projects considered at the conferences in 1923, 1924, and 1925 were presented in poster form at the Transcontinental Highways Exposition at Reno, Nev., June 25 to July 31, 1927. These posters are reproduced in part in Figures 1 to 6.

The work of the standing regional project committees appointed by the Western States conference has resulted in a request for a special investigation of the range-livestock industry by means of a cooperative project of the Department of Agriculture and the States of Arizona, Montana, New Mexico, Utah, and Wyoming. At the request of the Pullman conference the Bureau of Agricultural Economics made a study of the dairy industry in the Western States. The results of these studies and surveys either have been or are being made available to the States. These standing regional committees review annually the progress made in carrying out the program and make such revision of recommendations as may be warranted by new facts.

The series of Western States regional conferences is the center of the whole fact-organization and program-making effort. It has furnished the idealism without which any considerable effort must fail. In each of the States the study of particular enterprises has shown that State boundary lines have little relation to economic or enterprise areas.

The wheat conferences in Oregon and Washington disclosed that this enterprise must be considered from the standpoint of the Northwest, which includes Oregon, Washington, Idaho, and Montana. In Idaho the poultry committee studies brought out the necessity of intimate knowledge of Los Angeles market conditions. In Nevada the State and irrigation-project conferences developed that the facts relating to California were even more important than the facts relating to Nevada. Much reenforcement has already been drawn from the studies made in California. The prune committees in Oregon at once found that the prune enterprise was a joint one with Washington, California, and Idaho.

These illustrations point to the need of regional consideration and regional conferences. Ultimately the State and county extension programs must be based on a knowledge of the whole situation as it affects the enterprise, and not simply on its local manifestations. There is no political or administrative overhead on a regional basis with personnel and funds to carry on, so drafts are being made on the Federal Department of Agriculture and other Federal departments. As the fact-organization effort proceeds such requests increase and already have brought into existence a new type of project, in which a bureau of the Federal Department of Agriculture and several State experiment stations and extension services cooperate, as in the range-livestock survey.

CROP PROGRAM

1. ALFALFA AS A FORAGE CROP.
2. CORN AND BARLEY AS SUPPLEMENTARY FEED.
3. WHEAT AND POTATOES AS CASH CROPS.
4. VEGETABLES AND FRUIT CROPS FOR HOME USE.
5. DIVERSIFICATION.
6. STANDARDIZATION OF VARIETIES.
7. CONTROL OF DISEASES AND INSECT PESTS.
8. WEED CONTROL.
9. ECONOMIC USE OF WATER.

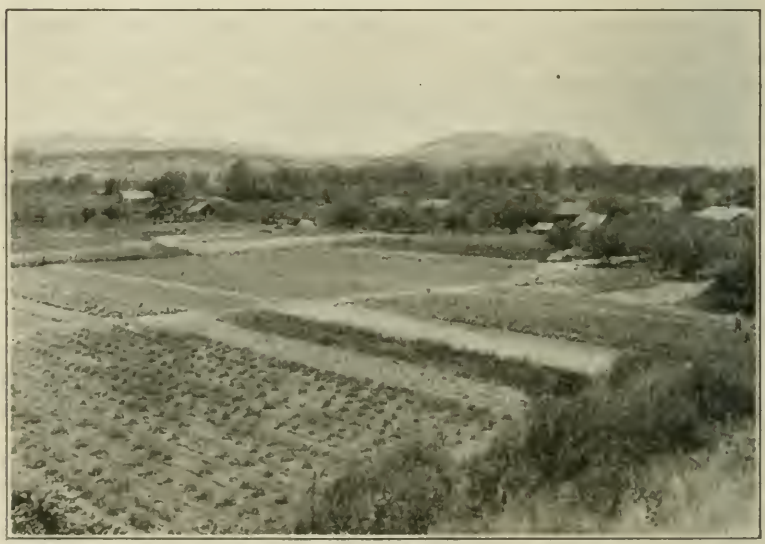

FIG. 4.—Portion of a poster displaying the important features of the Western States crop program

At one time the standing regional extension committees hoped that they might broaden their personnel by additions from the experiment stations, producers, and other allied agencies and thus make the regional enterprise conferences more representative. The need for such organization is apparent. It is still a possible development of the future. The chairmen of the regional committees are functioning as liaison officers between the extension services of the several States and the Federal Government.

In the field of home economics the work of the standing nutrition and home-management committees has been even more fruitful than the work of the standing committees in agriculture. A remarkable coordination and standardization of projects has taken place, and

HOME-MANAGEMENT PROGRAM

1. KITCHEN IMPROVEMENT TO SAVE LABOR.
2. INSTALLATION OF WATER AND HOME SEWAGE-DISPOSAL SYSTEM.
3. HOME FURNISHING TO PROMOTE COMFORT AND ATTRACTIVENESS.
4. HOME ACCOUNTS AND BUDGETS.
5. HOME PLANNING AND REMODELING.

FIG. 5.—Portion of a poster displaying the important features of the Western States home-management extension program

the regional reenforcement in carrying out State projects is manifest in the plans of work for almost every State.

Boys' and girls' clubs are functioning as never before as effective demonstration agencies in reenforcing the adult extension projects.

RESULTS OF REGIONAL CONFERENCES

Following are some of the results of the fact-organization effort, after five years of organized regional program development.

This effort has made the extension personnel of the Western States regionally minded. It has broadened the horizon; there is less provincialism and more toleration. It is more clearly seen that the important problem is not a personal one, nor a county one, nor

often even a State one, but that the Western States have much in common and must go along together in most things. It has helped extension workers to focus their efforts on the larger objectives.

It has brought the extension and research personnel of the State and Federal Governments into better working relationship and is bringing about a coordination of projects among the States and within the States.

It is discovering the absence of needed facts—the need for more research. It has had an effect on the investigational projects of the Federal Department of Agriculture and of the individual States under the Purnell Act.

It has brought the western situation more concretely to the attention of the Federal Department of Agriculture. The West is a long way from Washington. Western agriculture measured by middle-western standards may not seem important, but is of tremendous importance to the West. There are now but few offices in the Federal Department of Agriculture that have not heard of the Western States program and the individual State programs. The Department of Agriculture believes in the effort. It is anxious to cooperate. That is why so many representatives of the department attend the Western States regional conferences.

It has made extension workers surer of their projects and given them more faith in what is being done. It has not so far greatly changed the kind of projects. In the main the same things are being done, but it has often changed the emphasis and given facts to back up the judgment used in selecting projects.

It has helped to counteract ill-considered advice, whether selfish or merely uninformed. The West, like the rest of the country, is full of people who "know" how to save the farmer. They are usually well-meaning, sometimes themselves the victims of propaganda. The regional, State, and county conferences have furnished the county agents with facts arrived at in conferences in which these well-meaning advisers have often participated.

The western program-making effort has placed the agricultural college in the place of leadership that properly belongs to it. It has coordinated the miscellaneous and often contradictory efforts of educational, business, and political agencies. It has given them a place in the program where they can do the things that they are best prepared to do.

For the first time it has focused extension attention on the great livestock industry of the West, the dry-land problem, and the problem of land utilization. It has brought about a helpful and friendly understanding between the livestock producers and the extension agents.

It has helped the county agent to focus on the essentials and to make the programs more definite, more condensed. There are more long-time goals and less miscellaneous, unrelated effort.

It is helping to coordinate the home program with the agricultural program and has brought about a better realization of the fact that, particularly in the West, a settled, stable, satisfactory farm home is fundamental to the full development of the economic program. This is reflected in the fact that last year practically every agricultural agent in the West in counties having no home demonstration agent carried on more home projects.

FARM-MANAGEMENT PROGRAM

1. PROFITABLE PRODUCTION METHODS.
2. ADJUSTMENT OF FARM ORGANIZATION.
   - (a) TO REDUCE PRODUCTION COSTS.
   - (b) TO MEET CHANGING CONDITIONS.
   - (c) TO RAISE STANDARD OF LIVING.
3. PLANNING PRODUCTION TO MEET MARKET DEMANDS.
   BY MAKING AVAILABLE TO FARMERS AND RANCHMEN THE CROP AND LIVESTOCK SITUATION, OUTLOOK, AND PRICE TENDENCIES.
4. ORGANIZATION OF AGRICULTURAL FACTS AS A BASIS OF AN EXTENSION PROGRAM.

FIG. 6.—Portion of a poster displaying the important features of the Western States farm-management extension program

Perhaps most of all it has brought a more complete realization of the geographical position of the West in the country and in the world and of the fact that a high-quality product is the only profitable surplus product possible for western agriculture.

"The West must grow the best!" should be the slogan; and, as a corollary to it, "The West must live the best!"

The effort toward fact-determined programs in the West has already done much; but it is only a step, and unless the next step is taken the effort will fall short of successful accomplishment.

So far the effort has been to find the facts and to a somewhat less degree to focus the facts. The next big step is to present the settled related facts in such a way that farmers of the West may be guided by them to more accurate thinking, more satisfactory conclusions, more advantageous decisions. This is the aim of all extension work. To this end detailed studies of extension programs in several States and counties and particularly the recommendation of the fact-organization conferences are being made. These are compared with an analysis of the extension programs of the agents during the last three to five years. One object of this is to see what influence the study of facts has had on extension projects and then to develop a detailed extension procedure to put the economic program to work. The extension connection with fact organization may at times have been on the border line or even outside of what is commonly called extension work. The field was entered because of necessity. The work needed to be done, and the laborers were few. Now, with the increasing funds available for research it is hoped that the experiment stations, at least to some degree, can carry on this enterprise.

The step now being taken, that of finding the best way to publish the facts, popularize them, and so translate them into concrete, visible demonstration and obtain a large number of followers, is wholly an extension project.

The Western States extension procedure may be summarized as an effort to find the facts, focus the facts, and furnish the facts in such an attractive manner that the farmers of the West may, to their advantage, follow the facts.

A REGIONAL CONFERENCE ON POULTRY AND CLOTHING, 1927

The fourth of the series of regional program-making conferences was held at Reno, Nev., July 11 to 14, 1927, the subjects for consideration being poultry and clothing. In addition to adopting a regional program in these subjects the standing regional committees on range livestock, human nutrition, dairying, major farm crops, and home management made reports of progress and recommendations. The reports of the clothing and poultry committees follow. For full reports of the projects recommended by the three preceding conferences see Department Circulars 308, 335, and 375.

REPORT OF THE COMMITTEE ON CLOTHING

OBJECTIVE OF THE CLOTHING EXTENSION PROGRAM

The objective in the clothing extension program is to aid in the development of a higher standard of rural living through better standards of dress and improved personal appearance.

This objective may be attained through instruction enabling the farm family to clothe themselves economically, healthfully, and attractively.

In the extension program for clothing the following factors are considered:

(1) Economics:
  (*a*) Construction.
  (*b*) Renovation.
  (*c*) Remodeling (especially cutting down).
  (*d*) Selection of materials and ready-to-wear garments.
  (*e*) Systematic planning.
  (*f*) Care and storage.
(2) Health:
  (*a*) Posture.
  (*b*) Protection.
  (*c*) Ventilation.
  (*d*) Freedom of movement.
  (*e*) Cleanliness.
(3) Attractiveness:
  (*a*) Color.
  (*b*) Design.
  (*c*) Texture.
  (*d*) Finishings.
  (*e*) Accessories.

CLOTHING ACTIVITIES UNDER WAY IN 1926

Economical construction in adults', children's, and infants' clothing; special work in selection, design, and color theory and its application; use and alteration of commercial patterns; dress forms; renovating; remodeling; short cuts and use of machine attachments; hat making; special projects in shoe and hosiery selection; corsetry and posture; girls' clothing clubs; clothing budgets and accounts.

CONDITIONS AFFECTING FAMILY CLOTHING

The conditions affecting the clothing problem of the farm family are:

Limited and uncertain farm income.

The difficulty of systematic planning of family clothing expenditures.

Lack of opportunity for women to supplement the farm income by marketing home products because of small population and long distances to market centers.

More frequent replacement of clothing necessary because of alkali dust, intense sunlight, lack of water, and hardness of water.

Increased expenditure for warm clothing necessary for long-distance travel in extreme weather.

Long distances to adequate shopping centers limit the range of selection and increase the cost.

Lack of equitable distribution of clothing funds among the various members of the family.

Use of colors seriously influenced by climatic conditions affecting complexion.

Lack of appreciation of the effect of suitable and becoming clothing.

The many demands on the home maker's time and energy and her inability to procure hired help decrease the possibility of clothing construction within the home.

RECOMMENDATIONS OF THE COMMITTEE ON CLOTHING

That emphasis be placed on such clothing technic as will attain results with a minimum expenditure of time and energy and at the

same time meet health and aesthetic requirements through construction phases.

That farm women be taught what constitutes good value in materials, finishes, accessories, and ready-to-wear garments, and how to select them.

That the advantages of systematic planning in clothing the family be brought to the attention of farm women.

That farm women be encouraged to express in clothing, as well as in their homes, their innate desire for beauty.

That the relationship of clothing to health be emphasized through such projects as shoe selection, corsetry, and posture.

That better use be made of opportunities in girls' club work to teach clothing selection and construction.

That research study be made of alterations necessary in ready-to-wear garments and commercial patterns.

That time studies be made in connection with clothing construction in the home.

That further research be made regarding the relation of clothing to health.

That further research be made in the economic aspects of clothing.

MADGE J. REESE,
Chairman, Field Agent, Western States,
Office of Cooperative Extension Work,
United States Department of Agriculture,
MARY STILLWELL BUOL,
Assistant Extension Director, Idaho,
AFTON ODELL,
Clothing Specialist, Utah,
BLANCHE E. HYDE,
Clothing Specialist, Colorado,
Committee.

REPORT OF THE COMMITTEE ON POULTRY

RECENT TREND AND PRESENT CONDITION OF POULTRY INDUSTRY

Egg production in the United States increased more than twice as fast as did the population from 1919 to 1924. Indications are that this rate of increase in egg production has been maintained since 1924. Purchasing power of consumers has been relatively high. Egg producers have fared rather better than producers of many other farm products. Expansion was a natural and widespread response to favorable market conditions and to improved methods of production.

The increase in production of eggs in the five years from 1919 to 1924 amounted to 60 per cent in the Pacific Coast States and 33 per cent in the Mountain States. In the same period the New England and Middle Atlantic States, the principal competitors of western specialized egg producers, increased their production 51 per cent and 43 per cent, respectively. Even in the North Central States, without specialization, production increased about 10 per cent on a much larger base. The 11 Western States, which have 10 or 11 per cent of the chickens on farms, produce about 14 per cent of the Nation's egg crop.

OUTLOOK

So many egg producers in different parts of the country have already learned how to meet the demand for fresh eggs in the fall and winter months and have prepared to do it that individuals and communities thinking of expansion beyond the capacity of their local markets should consider carefully the economic factors affecting the efficient marketing and economical production of eggs.

With egg prices tending downward and feed prices upward, and with transportation and other fixed charges demanding a larger share of the poultryman's gross return, the chances for success in egg production are not so good now as they have been during the last few years.

Changes in the seasonal distribution of production of eggs for market have been so marked in recent years that the business of storing eggs in the flush season against the consumer demand in the winter has been distinctly unprofitable for many operators. Until production again settles down to some new normal distribution storage may be financially hazardous to operators and producers.

There seems to be little immediate danger of industrial disturbances of sufficient importance to affect seriously the consumer demand for high-grade poultry products.

The present consumer demand for eggs of ordinary quality is not likely to increase greatly in the near future because of the large and increasing number of other foodstuffs that compete with eggs for a share of the consumer's appetite.

The main favorable factor in the outlook for specialized egg producers is the seemingly insatiable demand for fresh eggs of high quality in the fall and winter months and to a less extent for eggs of the highest quality at other periods.

Although readjustments in egg production to meet changes in market demands are already taking place, it is difficult to forecast the time needed to make the readjustment complete.

During the present period of small margins of profit in egg production, overhead charges in production, mortality of fowls, capital invested in land, buildings, and other equipment, and overhead marketing costs are certain to be determining factors in the success of the poultry enterprise on many poultry farms.

The development of the egg industry in the Western States to the point where it is now dependent upon successful marketing in distant consuming areas in direct competition with near-by eggs, emphasizes the need for constant effort on the part of western poultrymen to produce eggs of high quality for eastern shipments.

During the present period of depression in the egg industry good poultrymen are likely to make it unusually difficult for poor poultrymen to succeed.

PHASES TO BE EMPHASIZED AND EXTENSION PROGRAM FOR SPECIALIZED COMMERCIAL POULTRY PRODUCTION

A specialized commercial flock is designated as one from which the owner obtains at least 75 per cent of his income.

General requirements.—Size of flock: Size of specialized commercial poultry flock should be at least 1,500 hens, or hens of such a

type as will return a corresponding net income (specialized pedigreed breeding flock).

Capital: Capital to the amount of $5 per hen, or at least $3 in cash and sure credit to the amount of $2, should be available for going into specialized commercial poultry production.

Land: Five acres per 1,000 hens is recommended, with the exception that in cases where less than 5 acres per 1,000 hens is used, special facilities such as hard-surfaced yards should be provided to maintain good sanitation.

Extension program.—Flock management: In order that poultrymen may know the actual condition of their business, it is recommended that more stress be laid on record keeping. It is further recommended that extension workers give more attention to the analysis of records to determine the trend of the industry and to aid in developing a sound poultry-extension program.

Check tests: It is recommended that extension workers cooperate with specialized commercial poultrymen in conducting control tests to determine the value of various methods of management of commercial flocks.

Sanitation and disease: Considering the fact that for a permanent poultry industry not enough emphasis has been placed upon sanitation, it is recommended that the extension service in the 11 Western States lay special emphasis on a more strict sanitation program, particularly as related to soil and to house management.

Marketing: It is recommended that extension workers study and encourage cooperative marketing along the lines already proved successful.

Green feed: On the basis of present information it is recommended that ample facilities for the production of green feed be provided, except where a more economical source of vitamin A can be obtained.

RECOMMENDATIONS FOR COMMERCIAL SIDE-LINE FLOCKS

Definition.—Side-line flocks shall include all flocks between the farm flock and the specialized commercial flock.

Flock replenishing.—Flocks should be replenished with chicks purchased from high-quality "bred-to-lay" stock, and if possible, from accredited or certified stock. Additional data shall be collected that will determine the percentage of the flock that should be replaced annually.

Educational program.—An educational program should be carried on that will emphasize correct housing, feeding, rearing, and sanitation. Special education should be given in the management of flocks for the production of high-quality eggs.

Marketing.—Flocks should be of sufficient size that eggs may be delivered at intervals frequent enough to insure a product that will meet standard grade requirements.

Boys' and girls' club work.—Members of boys' and girls' clubs should be used as demonstrators of better practices in housing, rearing, feeding, and management of the small poultry flock. A score card for club members should be adopted that will embrace vital breeding and egg-production qualities.

RECOMMENDATIONS FOR FARM FLOCKS

Definition.—A farm flock should be of a size sufficient to supply farm needs. It is recommended that the owner of this type of flock maintain standard breeds of good stock and follow good managerial practices.

REPORT OF THE SUBCOMMITTEE ON TURKEY PRODUCTION

Little definite information on the turkey industry is available, and methods of production are not uniform. This committee, therefore, recommends that more time be devoted to turkey projects by extension workers in localities where natural conditions are favorable for turkey production.

The principal phases of the work to be emphasized should include:

(1) Selection and management of breeding stock to produce greater vitality in the poults.
(2) Project relating to the rearing of poults:
  (*a*) Feeding methods.
  (*b*) Range.
  (*c*) Sanitation and disease control.
  (*d*) Preparation for market.
  (*e*) Establishment of uniform grades.
  (*f*) More effective marketing methods.

The committee recommends that more information be supplied by the poultry division of the Bureau of Agricultural Economics in regard to—

The number of turkeys on hand for breeding purposes as compared with previous years.
The number of turkeys hatched.
The probable supply of turkeys to be marketed.

This information should be made available to extension workers as rapidly as it is obtained.

It is recommended that the United States Department of Agriculture and the State experiment stations investigate more extensively the feeding requirements of turkeys, sanitation and disease control, housing requirements, and other important phases of turkey production.

Because of the lack of knowledge of established grades, and the loss to the producers on account of the miscellaneous methods of grading turkeys, it is recommended that the poultry division of the Bureau of Agricultural Economics make available to all extension poultry specialists the United States standards for grading turkeys, prior to this year's marketing season, and that these grades be adopted by the 11 Western States.

Experience has shown that the artificial hatching and brooding of baby turkeys offers greater advantages than the natural method in cost of production and reduction of losses. This committee therefore recommends that artificial methods of hatching and brooding of turkeys be encouraged by extension workers in commercial turkey-growing districts.

Because of the lack of information on the cost of turkey production, the committee recommends that the United States Department of

Agriculture, the experiment stations, and extension poultrymen assemble cost-of-production records as soon as possible and make them available for poultry-extension workers.

It is also recommended that the extension specialists promote and encourage turkey club work among boys and girls.

GENERAL RECOMMENDATIONS FOR THE POULTRY INDUSTRY

Extension workers should encourage poultrymen to support and patronize accredited and certified hatchery enterprises in order to improve production and vitality of stock.

Inasmuch as there are many and serious unsolved problems in connection with flock management and poultry diseases, it is recommended that greater facilities be provided by experiment stations and the United States Department of Agriculture for research work in poultry husbandry, and that there be the greatest cooperation possible between extension workers and research staffs.

WILLIAM PETERSON,
Chairman, Extension Director, Nevada,
M. W. BUSTER,
Poultry Specialist, California,
HARRIETTE E. CUSHMAN,
Poultry Specialist, Montana,
W. D. BUCHANAN,
Poultry Specialist, Washington,
Committee.

The above reports of the committees on clothing and poultry were considered and approved by the coordinating committee.

W. A. LLOYD,
Chairman, Regional Agent in Charge, Western States,
Office of Cooperative Extension Work,
United States Department of Agriculture,
CECIL W. CREEL,
Extension Director, Nevada,
PAUL V. MARIS,
Extension Director, Oregon,
S. B. NELSON,
Extension Director, Washington,
A. E. BOWMAN,
Extension Director, Wyoming,
ROUD MCCANN,
Extension Director, Colorado,
B. H. CROCHERON,
Extension Director, California,
P. H. ROSS,
Extension Director, Arizona,
Committee.

The reports were presented to the conference and on motion adopted.

CECIL W. CREEL,
Chairman, Extension Director, Nevada.
WILLIAM PETERSON,
Extension Director, Utah,
MADGE J. REESE,
Field Agent, Western States,
Office of Cooperative Extension Work,
United States Department of Agriculture,
Committee in Charge of the Conference.

The conference adjourned to meet at Laramie, Wyo., in November, 1928, at which time there will be a reconsideration of the range-livestock, dairy, and human-nutrition program, of examples of progress, and of effective extension methods of carrying out the recommendations.

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BY

MABEL G. HUNT
Head Indexer, Office of Information
United States Department of Agriculture

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BY

MABEL G. HUNT
Head Indexer, Office of Information
United States Department of Agriculture

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1. Medical milk commissions and certified milk. Ernest Kelly. 1913. Revision of Bureau of Animal Industry Bul. 104.
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187. Preliminary census of birds of the United States. Wells W. Cooke. 1915.
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189. Studies of the codling moth in the central Appalachian region. F. E. Brooks and E. B. Blakeslee. 1915.
190. The drainage of irrigated lands. R. A. Hart. 1915.
191. Demurrage information for farmers. G. C. White. 1915.
192. Insects affecting vegetable crops in Porto Rico. Thomas H. Jones. 1915.
193. The drainage of Jefferson County, Tex. H. A. Kipp, A. G. Hall, and S. W. Fredcoln. 1915.
194. The flow of water in irrigation channels. Fred C. Scobey. 1915.
195. Potato breeding and selection. William Stuart. 1915.
196. Methods followed in the commercial canning of foods. A. W. Bitting. 1915.
197. Homemade lime-sulphur concentrate. E. W. Scott. 1915.
198. Report upon the Cypress Creek drainage district, Desha and Chicot Counties, Ark. S. H. McCrory, O. G. Baxter, D. L. Yarnell, L. A. Jones, and W. J. Schlick. 1915.
199. Loss in tonnage of sugar beets by drying. Harry B. Shaw. 1915.
200. A maggot trap in practical use: An experiment in house-fly control. R. H. Hutchinson. 1915.
201. Native pasture grasses of the United States. David Griffiths, George L. Bidwell, and Charles E. Goodrich. 1915.
202. The alcohol test in relation to milk. S. Henry Ayres and William T. Johnson, jr. 1915.
203. Field studies of the crown-gall of sugar beets. C. O. Townsend. 1915.
204. Report on the gipsy moth work in New England. A. F. Burgess. 1915.
205. Eleven important wild duck foods. W. L. McAtee. 1915.
206. The wool grower and the wool trade. F. R. Marshall and L. L. Heller. 1915.
207. The cypress and juniper trees of the Rocky Mountain Region. George B. Sudworth. 1915.
208. Yields of native prickly pear in southern Texas. David Griffiths. 1915.
209. Testing grape varieties in the vinifera regions of the United States. George C. Husmann. 1915.
210. Seed production of western white pine. Raphael Zon. 1915.
211. Factors affecting range management in New Mexico. E. O. Wooton. 1915.
212. Observations on the pathology of the jack pine. James R. Weir. 1915.
213. The use of land in teaching agriculture in secondary schools. Eugene Merritt. 1915.
214. Spring wheat in the Great Plains area: Relation of cultural methods to production. E. C. Chilcott, J. S. Cole, and W. W. Burr. 1915.
215. Composition of corn (maize) meal manufactured by different processes and the influence of composition on the keeping qualities. A. L. Winton, W. C. Burnet, and J. H. Bornmann. 1915.
216. Cotton warehouses: Storage facilities now available in the South. Robert L. Nixon. 1915.
217. Mortality among waterfowl around Great Salt Lake, Utah. (Preliminary report.) Alex Wetmore. 1915.
218. Oats in the Great Plains area: Relation of cultural methods to production. E. C. Chilcott, J. S. Cole, and W. W. Burr. 1915.
219. Corn in the Great Plains area: Relation of cultural methods to production. E. C. Chilcott, J. S. Cole, and W. W. Burr. 1915.
220. Road models. 1915.
221. The southern corn leaf-beetle. E. O. G. Kelly. 1915.
222. Barley in the Great Plains area: Relation of cultural methods to production. E. C. Chilcott, J. S. Cole, and W. W. Burr. 1915.
223. Botanical characters of the leaves of date palm used in distinguishing cultivated varieties. Silas C. Mason. 1915.
224. A study of the preparation of frozen and dried eggs in the producing section. M. E. Pennington, M. K. Jenkins, W. A. Stocking, S. H. Ross, E. Q. St. John, Norman Hendrickson, and W. B. Hicks. 1915.
225. A system of accounting for cooperative fruit associations. G. A. Nahstoll and W. H. Kerr. 1915.
226. The verbena bud moth. D. E. Fink. 1915.

227. The toxicity to fungi of various oils and salts, particularly those used in wood preservation. C. J. Humphrey and Ruth M. Fleming. 1915.
228. Effect of frequent cutting on the water requirement of alfalfa and its bearing on pasturage. Lyman J. Briggs and H. L. Shantz. 1915.
229. The naval stores industry. A. W. Schorger and H. S. Betts. 1915.
230. Oil-mixed Portland cement concrete. Logan Waller Page. 1915.
231. Recent studies of the Mexican cotton boll weevil. B. R. Coad. 1915.
232. The production of lumber in 1913. 1915.
233. Relation of the Arizona wild cotton weevil to cotton planting in the arid West. B. R. Coad. 1915.
234. Utilization and management of lodgepole pine in the Rocky Mountains. D. T. Mason. 1915.
235. Control of dried-fruit insects in California. William B. Parker. 1915.
236. A system of accounts for farmers' cooperative elevators. John R. Humphrey and W. H. Kerr. 1915.
237. Strawberry supply and distribution in 1914. Wells A. Sherman, Houston F. Walker, and O. W. Schleussner. 1915.
238. Sugar beets: Preventable losses in culture. Harry B. Shaw. 1915.
239. The eggplant lace-bug. David E. Fink. 1915.
240. Pasteurizing milk in bottles and bottling hot milk pasteurized in bulk. S. Henry Ayres and W. T. Johnson, jr. 1915.
241. Studies on fruit juices. H. C. Gore. 1915.
242. Corn, milo, and kafir in the southern Great Plains area: Relation of cultural methods to production. E. F. Chilcott, W. D. Griggs, and C. A. Burmeister. 1915.
243. Cone beetles: Injury to sugar pine and western yellow pine. John M. Miller. 1915.
244. Life history of short-leaf pine. Wilbur R. Mattoon. 1915.
245. Further experiments in the destruction of fly larvae in horse manure. F. C. Cook, R. H. Hutchison, and F. M. Scales. 1915.
246. Vitrified brick pavements for country roads. Vernon M. Peirce and Charles H. Moorefield. 1915.
247. A disease of pines caused by *Cronartium pyriforme*. George G. Hedgcock and William H. Long. 1915.
248. Fleas. F. C. Bishopp. 1915.
249. Portland cement concrete pavements for country roads. Charles H. Moorefield and James T. Voshell. 1915.
250. Food plants of the gipsy moth in America. F. H. Mosher. 1915.
251. The calosoma beetle (*Calosoma sycophanta*) in New England. A. F. Burgess and C. W. Collins. 1915.
252. Life history of the codling moth in Maine. E. H. Siegler and F. L. Simanton. 1915.
253. The effect of different times of plowing small-grain stubble in eastern Colorado. O. J. Grace. 1915.
254. The sharp-headed grain leafhopper. Edmund H. Gibson. 1915.
255. Douglas fir pitch moth. Josef Brunner. 1915.
256. Katydids injurious to oranges in California. J. R. Horton and C. E. Pemberton. 1915.
257. Progress reports of experiments in dust prevention and road preservation, 1914, 1915.
258. Lessons in elementary agriculture for Alabama schools outlined by months. E. A. Miller. 1915.
259. Studies on changes in the degree of oxidation of arsenic in arsenical dipping baths. Robert M. Chapin. 1915.
260. The dog as a carrier of parasites and disease. Maurice C. Hall. 1915.
261. American plum borer. E. B. Blakeslee. 1915.
262. The parandra borer as an orchard enemy. Fred E. Brooks. 1915.
263. The cranberry rootworm. H. B. Scammell. 1915.
264. The violet rove-beetle. F. H. Chittenden. 1915.
265. The dock false-worm; An apple pest. E. J. Newcomer. 1916.
266. Outlets and methods of sale for shippers of fruits and vegetables. J. W. Fisher, jr., J. H. Collins, and Wells A. Sherman. 1915.
267. Methods of wholesale distribution of fruits and vegetables on large markets. J. H. Collins, J. W. Fisher, jr., and Wells A. Sherman. 1915.
268. Crop production in the Great Plains area: Relation of cultural methods to yields. E. C. Chilcott, J. S. Cole, and W. W. Burr. 1915.
269. Farmers' Institute work in the United States in 1914, and notes on agricultural extension work in foreign countries. J. M. Stedman. 1912.
270. Cereal experiments at the Williston Station. F. Ray Babcock. 1915.
271. Dates of Egypt and the Sudan. S. C. Mason. 1915.
272. The southern cypress. Wilbur R. Mattoon. 1915.
273. Dispersion of the gipsy moth larvae by the wind. C. W. Collins. 1915.
274. Factors governing the successful shipment of red raspberries from the Puyallup Valley. H. J. Ramsey. 1915.
275. Forest pathology in forest regulation. E. P. Meinecke. 1916.
276. The pea aphis with relation to forage crops. J. J. Davis. 1915.
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279. Single-stalk cotton culture at San Antonio. Rowland M. Meade. 1915.
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283. The production of sulphuric acid and a proposed new method of manufacture. William H. Waggaman. 1915.
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286. Strength tests of structural timbers treated by commercial wood-preserving processes. H. S. Betts and J. A. Newlin. 1915.
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288. Custom ginning as a factor in cottonseed deterioration. D. A. Saunders and P. V. Cardon. 1915.
289. Red-clover seed production: Pollination studies. J. M. Westgate, H. S. Coe, A. T. Winneko, F. E. Robbins, H. D. Hughes, L. H. Pammel, and J. N. Martin. 1915.
290. Rail shipments and distribution of fresh tomatoes, 1914. Wells A. Sherman, Paul Froehlich, and Houston F. Walker. 1915.
291. Breeding millet and sorgo for drought adaptation. A. C. Dillman. 1916.
292. Distribution and migration of North American gulls and their allies. Wells W. Cooke. 1915.
293. The grasshopper outbreak in New Mexico during the summer of 1913. Harrison E. Smith. 1915.
294. Lessons on cotton for rural common schools. C. H. Lane. 1915.
295. The Zimmerman pine moth. Josef Brunner. 1915.
296. Our foreign trade in farm and forest products. Perry Elliott. 1915.
297. Cereal investigations on the Belle Fourche experiment farm. Ceell Salmon. 1915.
298. Peach supply and distribution in 1914. Wells A. Sherman, Houston F. Walker, and L. Herbert Martin. 1915.
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302. Apple market investigations, 1914–15. Clarence W. Moomaw and M. M. Stewart. 1915.
303. A bacteriological study of retail ice cream. S. Henry Ayers and William T. Johnson, jr. 1915.
304. Land drainage by means of pumps. S. M. Woodward and C. W. Okey. 1915.
305. Exercises with plants and animals for southern rural schools. E. A. Miller. 1915.
306. Some effects of selection on the production of alkaloids in belladonna. A. F. Sievers. 1915.
307. Tests of corn varieties on the Great Plains. L. L. Zook. 1915.
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309. Zacaton as a paper-making material. Charles J. Brand and Jason L. Merrill. 1915.
310. Digestibility of some animal fats. C. F. Langworthy and A. D. Holmes. 1915.
311. The handling and marketing of the Arizona Egyptian cotton of the Salt River Valley. J. G. Martin. 1915.
312. Phosphate rock and methods proposed for its utilization as a fertilizer. William H. Waggaman and William H. Fry. 1915.
313. Features of the sheep industries of the United States, New Zealand, and Australia compared. F. R. Marshall. 1915.
314. Methods for the examination of bituminous road materials. Prévost Hubbard and Charles S. Reeve. 1915.
315. Cantaloupe marketing in the larger cities, with car-lot supply, 1914. Wells A. Sherman, A. Dexter Gall, jr., and Faith L. Yeaw. 1915.
316. Willows: Their growth, use, and importance. George N. Lamb. 1915.
317. Larch mistletoe: Some economic considerations of its injurious effects. James R. Weir. 1916.
318. The bonavist lablab, or hyacinth bean. C. V. Piper and W. J. Morse. 1915.
319. Fermented milks. L. A. Rogers. 1916.
320. Farm practice in the cultivation of corn. H. R. Cates. 1916.
321. Cost of fencing farms in the North Central States. H. N. Humphrey. 1916.
322. Utilization of American flax straw in the paper and fiber-board industry. Jason L. Merrill. 1916.
323. Importance and character of the milled rice imported into the United States. F. B. Wise. 1915.
324. Community production of Durango cotton in the Imperial Valley. Argyle McLachlan. 1915.
325. Honeybees: Wintering, yields, imports, and exports of honey. Samuel A. Jones. 1915.
326. Birds of Porto Rico. Alex Wetmore. 1916.
327. The spruce and balsam fir trees of the Rocky Mountain region. George B. Sudworth. 1916.
328. Milling and baking tests of wheat containing admixtures of rye, corn, cockle, kinghead, and vetch. R. C. Miller. 1915.
329. Notes on five North American buffalo gnats of the genus simulium. Arthur W. Jobbins-Pomeroy. 1916.
330. The milling of rice and its mechanical and chemical effect upon the grain. F. B. Wise and A. W. Broomell. 1916.
331. The handling and shipping of fresh cherries and prunes from the Willamette Valley. H. J. Ramsey. 1916.
332. Community production of Egyptian cotton in the United States. C. S. Scofield, T. H. Kearney, C. J. Brand, O. F. Cook, and W. T. Swingle. 1916.
333. Termites, or "white ants," in the United States: Their damage and methods of prevention. Thomas E. Snyder. 1916.
334. Directions for blueberry culture. 1916. Frederick V. Coville. 1915.
335. Development of sugar and acid in grapes during ripening. William B. Allwood, B. J. Hartman, J. R. Eoff, M. J. Ingle, and S. F. Sherwood. 1916.
336. Cereal experiments in Maryland and Virginia. T. R. Stanton. 1916.
337. A study of the tenant system of farming in the Yazoo-Mississippi delta. E. A. Boeger and E. A. Goldenweiser. 1916.
338. Machinery cost of farm operations in western New York. H. H. Mowry. 1916.
339. Experiments on the economical use of irrigation water in Idaho. Don H. Bark. 1916.
340. Experiments in vaccination against anthrax. Adolph Eichhorn. 1915.
341. Farm management practice of Chester County, Pa. W. J. Spillman, H. M. Dixon, and G. A. Billings. 1916.

342. The present status of the Pasteurization of milk. S. Henry Ayers. 1916.
343. Ground wood pulp: Part I. The grinding of cooked and uncooked spruce. Part II. Substitutes for spruce in the manufacture of ground-wood pulp. J. H. Thickens and G. C. McNaughton. 1916.
344. Studies on the biology of the Arizona wild cotton weevil. B. R. Coad. 1916.
345. Notes on the preoviposition period of the house fly, *Musca domestica* L. R. H. Hutchison. 1916.
346. Home projects in secondary courses in agriculture. H. P. Barrows. 1916.
347. Methods for the determination of the physical properties of road-building rock. Frank H. Jackson, jr. 1916.
348. Relation of mineral composition and rock structure to the physical properties of road materials. E. C. E. Lord. 1916.
349. The raisin industry. George C. Husmann. 1916.
350. The utilization of cherry by-products. Frank Rabak. 1916.
351. The terrapin scale: An important insect enemy of peach orchards. F. L. Simanton. 1916.
352. The cherry leaf-beetle, a periodically important enemy of cherries. R. A. Cushman and Dwight Isely. 1916.
353. Moisture content and shrinkage of forage, and the relation of these factors to the accuracy of experimental data. H. N. Vinall and Roland McKee. 1916.
354. Forests of Porto Rico, past, present, and future, and their physical and economic environment. Louis S. Murphy. 1916.
355. Extension course in soils for self-instructed classes in movable schools of agriculture. A. R. Whitson and H. B. Hendrick. 1916.
356. Milk and cream contests. Ernest Kelly, L. B. Cook, and J. A. Gamble. 1916.
357. Alaska and Stoner, or "miracle" wheats: Two varieties much misrepresented. Carleton R. Ball and Clyde E. Leighty. 1916.
358. Studies of the Mexican boll weevil in the Mississippi Valley. R. W. Howe. 1916.
359. Comparative spinning tests of the different grades of Arizona-Egyptian with Sea Island and Sakellaridis Egyptian cottons. Fred Taylor and William S. Dean. 1916.
360. Mistletoe injury to conifers in the Northwest. James R. Weir. 1916.
361. Comparison of the bacterial count of milk with the sediment or dirt test. H. C. Campbell. 1916.
362. A system of accounts for primary grain elevators. John R. Humphrey and W. H. Kerr. 1916.
363. The pink corn-worm: An insect destructive to corn in the crib. F. H. Chittenden. 1916.
364. Forest conservation for States in the southern pine region. J. Girvin Peters. 1916.
365. Larkspur poisoning of livestock. C. Dwight Marsh, A. B. Clawson, and Hadleigh Marsh. 1916.
366. Manufacturing tests of cotton fumigated with hydrocyanic-acid gas. William S. Dean. 1916.
367. Carrying capacity of grazing ranges in southern Arizona. E. O. Wooton. 1916.
368. Brown-rot of prunes and cherries in the Northwest. Charles Brooks and D. F. Fisher. 1916.
369. Bacteria in commercial bottled waters. Maud Mason Obst. 1916.
370. The results of physical tests of road-building rock. Prévost Hubbard and Frank H. Jackson, jr. 1916.
371. Patronage dividends in cooperative grain companies. John R. Humphrey and W. H. Kerr. 1916.
372. Commercial production of thymol from horsemint (*Monarda punctata*). S. C. Hood. 1916.
373. Brick roads. Vernon M. Peirce and Charles H. Moorefield. 1916.
374. The intrinsic values of grain, cottonseed, flour, and similar products, based on the dry matter content. E. G. Boerner. 1916
375. Disadvantages of selling cotton in the seed. Charles F. Creswell. 1916.
376. The flow of water in wood-stave pipe. Fred C. Scobey, Gardner S. Williams, Theron A. Noble, D. C. Henry, E. A. Moritz, E. W. Schoder, and L. M. Hoskins. 1916.
377. The Argentine ant: Distribution and control in the United States. Ernest R. Barber. 1916.
378. Fish meal: Its use as a stock and poultry food. F. C. Weber. 1916.
379. Dust explosions and fires in grain separators in the Pacific Northwest. David J. Price and E. B. McCormick. 1916.
380. *Endothia parasitica* and related species. C. L. Shear, Nell E. Stevens, and Ruby J. Tiller. 1917.
381. Business practice and accounts for cooperative stores. J. A. Bexell and W. H. Kerr. 1916.
382. Cotton boll-weevil control in the Mississippi Delta, with special reference to square picking and weevil picking. B. R. Coad. 1916.
383. New sorghum varieties for the central and southern Great Plains. H. N. Vinall and R. W. Edwards. 1916.
384. Costs and sources of farm-mortgage loans in the United States. C. W. Thompson. 1916.
385. School credit for home practice in agriculture. F. E. Heald. 1916.
386. Public road mileage and revenues in the Middle Atlantic States, 1914.
387. Public road mileage and revenues in the Southern States, 1914.
388. Public road mileage and revenues in the New England States, 1914.
389. Public road mileage and revenues in the Central, Mountain, and Pacific States, 1914.
390. Public road mileage and revenues in the United States, 1914.
391. Accuracy in commercial grading of opened eggs. M. K. Jenkins and Norman Hendrickson. 1918.
392. Lessons on tomatoes for rural schools. E. A. Miller. 1916.
393. Economic surveys of county highway improvement. J. E. Pennybacker and M. O. Eldridge. 1916.
394. A survey of typical cooperative stores in the United States. J. A. Bexell, Hector McPherson, and W. H. Kerr. 1916.
395. Peach scab and its control. G. W. Keitt. 1917.

396. Second annual report of bird counts in the United States, with discussion of results. Wells W. Cooke. 1916.
397. The grazing industry of the bluegrass region. Lyman Carrier. 1916.
398. Cereal experiments at the Judith Basin Substation, Moccasin, Mont. N. C. Donaldson. 1916.
399. The production of sweet-orange oil and a new machine for peeling citrus fruits. Possibility of the commercial production of sweet-orange oil from waste oranges. S. C. Hood and G. A. Russell. 1916.
400. Experiments with Marquis wheat. Carleton R. Ball and J. Allen Clark. 1916.
401. Marketing and distribution of western muskmelons in 1915. O. W. Schleussner and C. W. Kitchen. 1916.
402. Cereal experiments at the Akron Field Station, Akron, Colo. George A. McMurdo. 1916.
403. A system of accounts for livestock shipping associations. John R. Humphrey and W. H. Kerr. 1916.
404. Hemp hurds as paper-making material. Lyster H. Dewey and Jason L. Merrill. 1916.
405. Lupines as poisonous plants. C. D. Marsh, A. B. Clawson, and Hadleigh Marsh. 1916.
406. Distinguishing characters of the seeds of Sudan grass and Johnson grass. F. H. Hillman. 1916.
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408. Experiments during 1915 in the destruction of fly larvae in horse manure. F. C. Cook and R. H. Hutchison. 1916.
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410. Value to farm families of food, fuel, and use of house. W. C. Funk. 1916.
411. Systems of renting truck farms in southwestern New Jersey. Howard A. Turner. 1916.
412. The normal day's work of farm implements, workmen, and crews in western New York. H. H. Mowry. 1916.
413. Influence of age on the value of dairy cows and farm work horses. J. C. McDowell. 1916.
414. Convict labor for road work. J. E. Pennybacker, H. S. Fairbank, and W. F. Draper. 1916.
415. The recovery of potash from alunite. W. H. Waggaman and J. A. Cullen. 1916.
416. Red spider on cotton. E. A. McGregor and F. L. McDonough. 1917.
417. The genus calosoma. A. F. Burgess and C. W. Collins. 1917.
418. Western yellow pine in Oregon. Thornton T. Munger. 1917.
419. The grape leaf folder. J. F. Strauss. 1916.
420. Cooling hot-bottled Pasteurized milk by forced air. S. Henry Ayres, John T. Bowen, and W. T. Johnson, jr. 1916.
421. The sugar-beet thrips. Wm. H. White. 1916.
422. The eggplant tortoise beetle. Thomas H. Jones. 1916.
423. Labor requirements of dairy farms as influenced by milking machines. Harold N. Humphrey. 1916.
424. The Cottonwood borer. F. B. Milliken. 1916.
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426. Sugar pine. Louis T. Larsen and T. D. Woodbury. 1916.
427. The potato tuber moth. J. E. Grat. 1917.
428. *Medicago falcata*, a yellow-flowered alfalfa. R. A. Oakley and Samuel Garver. 1917.
429. Life history of the codling moth in the Pecos Valley, New Mexico. A. L. Quaintance and E. W. Geyer. 1917.
430. Cereal experiments on the Cheyenne Experiment Farm, Archer, Wyoming. Jenkin W. Jones. 1916.
431. Snebrood. G. F. White. 1917.
432. The spike-horned leaf miner, an enemy of grains and grasses. Philip Luginbill and T. D. Urbahns. 1916.
433. Changes in fresh beef during cold storage above freezing. Ralph Hoagland, Charles N. McBryde, and Wilmer C. Powick. 1917.
434. Judging the dairy cow as a subject of instruction in secondary schools. H. P. Barrows and H. P. Davis. 1916.
435. The apple leaf-sewer. B. R. Leach. 1916.
436. The desert corn flea-beetle. V. L. Wildermuth. 1917.
437. Flat-headed borers affecting forest trees in the United States. H. E. Burke. 1917.
438. The pear leaf worm. R. L. Nougaret, W. M. Davidson, and E. J. Newcomer. 1916.
439. The soybean, with special reference to its utilization for oil, cake, and other products. C. V. Piper and W. J. Morse. 1916.
440. Lumbering in the sugar and yellow pine region of California. Swift Berry. 1917.
441. The action of manganese under acid and neutral soil conditions. J. J. Skinner and E. R. Reid. 1916.
442. Possibility of the commercial production of lemon-grass oil in the United States. S. C. Hood. 1917.
443. The New Mexico range caterpillar and its control. V. L. Wildermuth and D. J. Caffrey. 1916.
444. False blossom of the cultivated cranberry. C. L. Shear. 1916.
445. The navel orange of Bahia; with notes on some little-known Brazilian fruits. P. H. Dorsett, A. D. Shamel, and Wilson Popenoe. 1917.
446. The cost of producing apples in the Wenatchee Valley, Wash. G. H. Miller and S. M. Thomson. 1917.
447. Water penetration in the gumbo soils of the Belle Fourche reclamation project. O. R. Mathews. 1916.
448. Separation and identification of food coloring substances. W. E. Mathewson. 1917.
449. A study of the electrolytic method of silver cleaning. H. L. Lang and C. F. Walton, jr. 1916.
450. Improvement of Ghirka spring wheat in yield and quality. J. Allen Clark. 1916.
451. The chemical composition of lime-sulphur animal dips. Robert M. Chapin. 1916.

452. The chemical composition of American grapes grown in the Central and Eastern States. William B. Alwood, B. G. Hartmann, J. R. Eoff, S. F. Sherwood, J. O. Carrero, and T. S. Harding. 1916.
453. The control of damping-off of coniferous seedlings. Carl Hartley and Roy G. Pierce. 1917.
454. The effect of cultural and climatic conditions on the yield and quality of peppermint. Frank Rabak. 1916.
455. The drying for milling purposes of damp and garlicky wheat. J. H. Cox. 1916.
456. Marketing creamery butter. Roy C. Potts and H. F. Meyer. 1917.
457. Relation between primary market prices and qualities of cotton. Fred Taylor. 1916.
458. Handling and marketing Durango cotton in the Imperial Valley. J. G. Martin and G. C. White. 1917.
459. The use of energy values in the computation of rations for farm animals. Revision of Farmers' Bulletin 346. Henry Prentiss Armsby. 1916.
460. The pine trees of the Rocky Mountain region. George B. Sudworth. 1917.
461. The identification of grasses by their vegetative characters. Lyman Carrier. 1917.
462. Irrigation in Florida. F. W. Stanley. 1917.
463. Earth, sand-clay, and gravel roads. Charles H. Moorefield. 1917.
464. Lessons on poultry for rural schools. F. E. Heald. 1916.
465. Propagation of wild duck foods. W. L. McAtee. 1917.
466. Maple sugar: Composition methods of analysis, effect of environment. A. Hugh Bryan, M. N. Straughn, C. G. Church, A. Given, and S. F. Sherwood. 1917.
467. The food value and uses of poultry. Helen W. Atwater. 1916.
468. Potatoes, sweet potatoes, and other starchy roots as food. C. F. Langworthy. 1917.
469. Fats and their economical use in the home. A. D. Holmes and H. L. Lang. 1916.
470. Studies on the digestibility of the grain sorghums. C. F. Langworthy and A. D. Holmes. 1916.
471. Eggs and their value as food. C. F. Langworthy. 1917.
472. Improved apparatus for determining the test weight of grain, with a standard method of making the test. E. G. Boerner. 1916.
473. Production of sugar in the United States and foreign countries. Perry Elliott. 1917.
474. True mahogany. C. D. Mell. 1917.
475. Reforestation on the national forests. C. R. Tillotson. 1917.
476. A study of cotton-market conditions in North Carolina with a view to their improvement. O. J. McConnell and W. R. Camp. 1917.
477. Marketing and distribution of strawberries in 1915. O. W. Schleussner and J. C. Gilbert. 1917.
478. The origin, characteristics, and quality of humpback wheat. Levi M. Thomas. 1916.
479. Nursery practice on the national forests. C. R. Tillotson. 1917.
480. Solid-stream spraying against the gipsy moth and the brown-tail moth in New England. L. H. Worthley. 1917.
481. The status and value of farm wood lots in the eastern United States. E. H. Frothingham. 1917.
482. Farming in the bluegrass region. J. H. Arnold and Frank Montgomery. 1917.
483. Statistics of fruits in the principal countries: Production, exports, and imports for the United States and foreign countries. H. D. Ruddiman. 1917.
484. Control of the gipsy moth by forest management. G. E. Clement and Willis Munro. 1917.
485. Apples: Production estimates and important commercial districts and varieties. H. P. Gould and Frank Andrews. 1917.
486. Sugar-cane culture for sirup production in the United States. P. A. Yoder. 1917.
487. Judging horses as a subject of instruction in secondary schools. H. P. Barrows. 1917.
488. Experiments in the disposal of irrigated crops through the use of hogs. James A. Holden. 1917.
489. A survey of beekeeping in North Carolina. E. G. Carr. 1916.
490. A preliminary report on the occurrence of western red-rot in *Pinus ponderosa*. W. H. Long. 1917.
491. The melon fly in Hawaii. E. A. Back and C. E. Pemberton. 1917.
492. An economic study of farming in Sumter County, Ga. H. M. Dixon and H. W. Hawthorne. 1917.
493. A study of American beers and ales. L. M. Tolman and J. Garfield Riley. 1917
494. A humidifier for lemon curing rooms. A. D. Shamel. 1917.
495. Spray irrigation. Milo B. Williams. 1917.
496. Investigations of the rotting of slash in Arkansas. W. H. Long. 1917.
497. Tests of western yellow pine car sills, joists, and small clear pieces. C. W. Zimmerman. 1917.
498. Experiments with spring cereals at the eastern Oregon dry farming substation, Moro, Oreg. David E. Stephens. 1917.
499. The mulched-basin system of irrigated citrus culture and its bearing on the control of mottle-leaf. Lyman J. Briggs, C. A. Jensen, and J. W. McLane. 1917.
500. The cost of producing apples in western Colorado. S. M. Thomson and G. H. Miller. 1917.
501. A study in the cost of producing milk on four dairy farms, located in Wisconsin, Michigan, Pennsylvania, and North Carolina. Morton O. Cooper, C. M. Bennet and L. M. Church. 1917.
502. The drainage of irrigated shale land. Dalton G. Miller and L. T. Jessup. 1917.
503. Turnips, beets, and other succulent roots and their use as food. C. F. Langworthy. 1917.
504. The theory of correlation as applied to farm-survey data on fattening baby beef. H. R. Tolley. 1917.
505. Digestibility of some vegetable fats. C. F. Langworthy and A. D. Holmes. 1917

500. Production of lumber, lath, and shingles in 1915 and lumber in 1914. J. C. Nellis. 1917.
507. Studies on the digestibility of some animal fats. C. F. Langworthy and A. D. Holmes. 1917.
508. Yields from the destructive distillation of certain hardwoods. R. C. Palmer. 1917.
509. The theory of drying and its application to the new humidity-regulated and recirculating dry kiln. Harry D. Tiemann. 1917.
510. Timber storage conditions in the Eastern and Southern States with reference to decay problems. C. J. Humphrey. 1917.
511. Farm practice in the cultivation of cotton. H. R. Cates. 1917.
512. Prevention of the erosion of farm lands by terracing. C. E. Ramser. 1917.
513. Fumigation of ornamental greenhouse plants with hydrocyanic-acid gas. E. R. Sasscer and A. D. Borden. 1917.
514. Wheat, yields per acre and prices, by States, 50 years, 1866–1915. 1917.
515. Corn, yields per acre and prices, by States, 50 years, 1866–1915. 1917.
516. Table for converting weights of mechanical separations into percentages of the sample analyzed. E. G. Boerner. 1916.
517. An intradermal test for *bacterium pullorum* infection in fowls. Archibald R. Ward and Bernard A. Gallagher. 1917.
518. The cost of producing apples in the Hood River Valley. S. M. Thomson and G. H. Miller. 1917.
519. Poles purchased, 1915. Arthur M. McCreight. 1917.
520. A system of accounts for cotton warehouses. Roy L. Newton and John R. Humphrey. 1917.
521. Courses in secondary agriculture for southern schools. (First and second years.) H. P. Barrows. 1917.
522. Characteristics and quality of Montana-grown wheat. Levi M. Thomas. 1917.
523. Utilization of ash. W. D. Sterrett. 1917.
524. Detection of lime used as a neutralizer in dairy products. H. J. Wichmann. 1917.
525. Experiments in the determination of the digestibility of millets. C. F. Langworthy and A. D. Holmes. 1917.
526. Experiments with single-stalk cotton culture in Louisiana, Arkansas, and North Carolina. P. V. Cardon. 1918.
527. Some exercises in farm handicraft for rural schools. H. O. Sampson. 1917.
528. Seasonal distribution of farm labor in Chester County, Pa. George A. Billings. 1917.
529. Validity of the survey method of research. W. J. Spillman. 1917.
530. The organization and management of a farmers' mutual fire insurance company. V. N. Valgren. 1917.
531. Rhizopus rot of strawberries in transit. Neil E. Stevens and R. B. Wilcox. 1917.
532. The expansion and contraction of concrete and concrete roads. A. T. Goldbeck and F. H. Jackson, jr. 1917.
533. Extension of cotton production in California. O. F. Cook. 1917.
534. Apple blotch and its control. John W. Roberts. 1917.
535. The horse-radish flea beetle: Its life history and distribution. F. H. Chittenden and Neale F. Howard. 1917.
536. The Mediterranean fruit fly in Hawaii. E. A. Back and C. E. Pemberton. 1918.
537. The results of physical tests of road-building rock in 1916, including all compression tests. Prévost Hubbard and Frank H. Jackson, jr. 1917.
538. Shrimp: Handling, transportation, and uses. Ernest D. Clark and Leslie McNaughton. 1917.
539. The lesser corn stalk-borer. Philip Luginbill and George G. Ainslie. 1917.
540. A first-year course in home economics for southern agricultural schools. Louise Stanley. 1917.
541. Cooperative organization by-laws. C. E. Bassett and O. B. Jesness. 1918.
542. The pollination of the mango. Wilson Popenoe. 1917.
543. Control of peach bacterial spot in southern orchards. John W. Roberts. 1917.
544. The red spruce: Its growth and management. Louis S. Murphy. 1917.
545. Important range plants: Their life history and forage value. Arthur W. Sampson. 1917.
546. Effect of fall irrigation on crop yields at Belle Fourche, S. Dak. F. D. Farrell and Beyer Aune. 1917.
547. Cooperative purchasing and marketing organizations among farmers in the United States. O. B. Jesness and W. H. Kerr. 1917.
548. The business of ten dairy farms in the Bluegrass region of Kentucky. J. H. Arnold. 1917.
549. Crossties purchased and treated in 1915. Arthur M. McCreight. 1917.
550. Control of the grape-berry moth in the Erie-Chautauqua grape belt. Dwight Isely. 1917.
551. Variation in the chemical composition of soils. W. O. Robinson, L. A. Steinkoenig, and William H. Fry. 1917.
552. The seasoning of wood. Harold S. Betts. 1917.
553. The chicken mite: Its life history and habits. H. P. Wood. 1917.
554. The cranberry girdler. H. B. Scammell. 1917.
555. Standard forms for specifications, tests, reports, and methods of sampling for road materials. 1917.
556. Mechanical properties of woods grown in the United States. J. A. Newells and R. C. Wilson. 1917.
557. A comparison of several classes of American wheats and a consideration of some factors influencing quality. L. M. Thomas. 1917.
558. Marketing grain at country points. George Livingston and K. B. Seeds. 1917
559. Accounting records for country creameries. John R. Humphrey and G. A. Nahstoll. 1917.
560. Cost of keeping farm horses and cost of horse labor. M. R. Cooper. 1917.
561. Feed cost of egg production. Harry M. Lamon and Alfred R. Lee. 1917.
562. The control of tobacco wilt in the flue-cured district. W. W. Garner, F. A. Wolf, and E. G. Moss. 1917.
563. The determination of bacteria in ice cream. S. Henry Ayers and W. T. Johnson, jr. 1917.

564. Collection of weevils and infested squares as a means of control of the cotton boll weevil in the Mississippi Delta. B. R. Coad and T. F. McGehee. 1917.
565. How to candle eggs. M. E. Pennington, M. K. Jenkins, and H. M. P. Betts. 1918.
566. The European earwig and its control. L. W. Jones. 1917.
567. Increased yield of turpentine and resin from double chipping. A. W. Schorger and R. L. Pettigrew. 1917.
568. The presence of arsenic in hops. W. W. Stockberger and W. D. Collins. 1917.
569. The sanitary control of tomato-canning factories. Burton J. Howard and Charles H. Stephenson. 1917.
570. The by-products of rice milling. J. B. Reed and F. W. Liepsner. 1917.
571. The pecan leaf case-bearer. John B. Gill. 1917.
572. The recovery of potash as a by-product in the cement industry. William H. Ross, Albert R. Merz, and C. R. Wagner. 1917.
573. The sheep industry on the Minidoka reclamation project. E. F. Rinehart. 1917.
574. The conversion of the weights of mechanical separations of corn, wheat, and other grains into percentages. E. G. Boerner. 1917.
575. Stock poisoning plants of the range. C. D. Marsh. 1918.
576. The manufacture of cottage cheese in creameries and milk plants. Arnold O. Dahlberg. 1917.
577. Experiments in the control of potato leak. Lon A. Hawkins. 1917.
578. A study of haymaking crews and labor costs. H. B. McClure. 1918.
579. Celery storage experiments. H. C. Thompson. 1917.
580. Effects of grazing upon western yellow pine reproduction in the national forests of Arizona and New Mexico. Robert R. Hill. 1917.
581. Microscopical studies on tomato products. Burton J. Howard and Charles H. Stephenson. 1917.
582. Farm management and farm profits on irrigated land in the Provo area. (Utah Lake Valley.) L. G. Connor. 1918.
583. Report on the experimental convict road camp, Fulton County, Ga. H. S. Fairbank, R. H. Eastham, and W. F. Draper. 1918.
584. The control of hog cholera, with a discussion of the results of field experiments. A. D. Melvin and M. Dorset. 1917.
585. A guide for formulating a milk ordinance. Bureau of Animal Industry and Bureau of Chemistry. 1917.
586. Progress reports of experiments in dust prevention and road preservation, 1916. 1918.
587. The handling and storing of apples in the Pacific Northwest. H. J. Ramsey, A. W. McKay, E. L. Markell, and H. S. Bird. 1917.
588. Increased cattle production on southwestern ranges. James T. Jardine and L. C. Hurtt. 1917.
589. The 28-hour law regulating the interstate transportation of livestock; Its purpose, requirements, and enforcement. Harry Goding and A. Joseph Raub. 1918.
590. A system of accounting for fruit shipping organizations. G. A. Nahstoll and John R. Humphrey. 1918.
591. Manufacturing tests of the official cotton standards for grade. William S. Dean and Fred Taylor. 1917.
592. Courses in secondary agriculture for southern schools. (Third and fourth years.) H. P. Barrows. 1917.
593. Judging sheep as a subject of instruction in secondary schools. H. P. Barrows. 1917.
594. Geography of wheat prices. L. B. Zapoleon. 1918.
595. Winter wheat in the Great Plains area: Relation of cultural methods to production. E. C. Chilcott, John S. Cole, and J. B. Kuska. 1917.
596. Feeding dried pressed potatoes to swine. Frank G. Ashbrook and R. E. Gongwer. 1917.
597. Some biological and control studies of *Gastrophilus haemorrhoidalis* and other bots of horses. W. E. Dove. 1918.
598. Orchard injury by the hickory tiger-moth. Dwight Isely. 1918.
599. The striped peach worm. H. G. Ingerson. 1918.
600. The relation of some of the rarer elements in soils and plants. W. O. Robinson, L. A. Steinkoenig, and C. F. Miller. 1917.
601. The handling and precooling of Florida lettuce and celery. H. J. Ramsey and E. L. Markell. 1917.
602. Value of a small plot of ground to the laboring man. A study of the food raised by operatives in southern cotton-mill towns. W. C. Funk. 1918.
603. A study of share-rented dairy farms in Green County, Wisconsin, and Kane County, Illinois. E. A. Boeger. 1918.
604. Incense cedar. J. Alfred Mitchell. 1918.
605. Lumber used in the manufacture of wooden products. J. C. Nellis. 1918.
606. Relative resistance of various hardwoods to injection with creosote. Clyde H. Teesdale and J. D. MacLean. 1918.
607. Tests of the absorption and penetration of coal tar and creosote in longleaf pine. Clyde H. Teesdale and J. D. MacLean. 1918.
608. Varieties of cheese: Descriptions and analyses. C. F. Doane and H. W. Lawson. 1918.
609. The sweet-potato leaf-folder. Thomas H. Jones. 1917.
610. Fish meal as a feed for swine. Frank G. Ashbrook. 1917.
611. Walnut blight in the Eastern United States. S. M. McMurran. 1917.
612. The digestibility of the dasheen. C. F. Langworthy and V. H. Holmes. 1917.
613. Digestibility of certain miscellaneous animal fats. Arthur D. Holmes. 1919.
614. Cost of producing apples in Yakima Valley, Wash. G. H. Miller and S. M. Thomson. 1918.
615. The economical winter feeding of beef cows in the Corn Belt. J. S. Cotton and Edmund H. Thompson. 1917.
616. The citrus thrips. J. R. Horton. 1918.

617. Australian saltbush. Roland McKee. 1919.
618. Experiments with durum wheat. Carleton R. Ball and J. Allen Clark. 1918.
619. Food habits of the swallows; a family of valuable native birds. F. E. L. Beal. 1918.
620. Effect of varying certain cooking conditions in the production of sulphite pulp from spruce. S. E. Lunak. 1918.
621. The crow and its relation to man. E. R. Kalmbach. 1918.
622. The identification of varieties of barley. Harry V. Harlan. 1918.
623. Citrus-fruit improvement: A study of bud variation in the Washington navel orange. A. D. Shamel, L. B. Scott, and C. S. Pomeroy. 1918.
624. Citrus-fruit improvement: A study of bud variation in the Valencia orange. A. D. Shamel, L. B. Scott, and C. S. Pomeroy. 1918.
625. Cropping systems for the moister portion of eastern Washington and Oregon and northern Idaho. Lee W. Fluharty. 1918.
626. Pasture land on farms in the United States. E. A. Goldenweiser and J. S. Ball. 1918.
627. Cost of harvesting wheat by different methods. Arnold P. Yerkes and L. M. Church. 1918.
628. Wintering and fattening beef cattle in North Carolina. W. F. Ward, R. S. Curtis, and F. T. Peden. 1918.
629. Greenhouse experiments on the rust resistance of oat varieties. John H. Parker. 1918.
630. Studies on the digestibility of some nut oils. A. D. Holmes. 1918.
631. Five years' calf-feeding work in Alabama and Mississippi. W. F. Ward and S. S. Jordan. 1918.
632. The utilization of waste tomato seeds and skins. Frank Rabak. 1917.
633. Factors of successful farming near Monett, Mo. W. J. Spillman. 1918.
634. A physical and chemical study of the Kafir kernel. George L. Bidwell. 1918.
635. The commercial freezing and storing of fish. Ernest D. Clark and Lloyd H. Almy. 1918.
636. Cost of production of apples in the Payette Valley, Idaho. S. M. Thomson and G. H. Miller. 1918.
637. A method of calculating economical balanced rations. J. C. Rundles. 1918.
638. Forestry and community development. Samuel T. Dana. 1918.
639. The market milk business of Detroit, Mich., in 1915. Clarence E. Clement and Gustav P. Warber. 1918.
640. The Mediterranean fruit fly. E. A. Back and C. E. Pemberton. 1918.
641. Farm practice in the production of hay in Steuben County, N. Y., and Washington County, Pa. H. B. McClure. 1918.
642. The four essential factors in the production of milk of low bacterial content. S. Henry Ayers, Lee B. Cook, and Paul W. Clemmer. 1918.
643. The melon fly. E. A. Back and C. E. Pemberton. 1918.
644. Lint percentage and lint index of cotton and methods of determination. G. S. Meloy. 1918.
645. Some reasons for spraying to control insect and mite enemies of citrus trees in Florida. W. W. Yothers. 1918.
646. Lessons on pork production for elementary rural schools. E. A. Miller. 1918.
647. The Argentine ant in relation to citrus groves. J. R. Horton. 1918.
648. A farm management survey in Brooks County, Ga. E. S. Haskell. 1918.
649. Experiments on the digestibility of fish. A. D. Holmes. 1918.
650. Lease contracts used in renting farms on shares. A study of the distribution of investments, expenses, and incomes between landlord and tenant. E. V. Wilcox. 1918.
651. A farm-management study in Anderson County, S. C. A. G. Smith. 1918.
652. The wet lands of southern Louisiana and their drainage. Charles W. Okey. 1918.
653. Lessons on corn for rural elementary schools. C. H. Lane. 1918.
654. Farm organization in the irrigated valleys of southern Arizona. R. W. Clothier. 1918.
655. Influence on linseed oil of the geographical source and variety of flax. Frank Rabak. 1918.
656. Concord grape juice: Manufacture and chemical composition. B. G. Hartman and L. M. Tolman. 1918.
657. A wheatless ration for the rapid increase of flesh on young chickens. M. E. Pennington, H. A. McAleer, A. D. Greenlee, A. W. Broomell, L. E. Harker, and H. L. Shrader. 1918.
658. Forest disease surveys. James R. Weir and Ernest E. Hubert. 1918.
659. A farm management study of cotton farms of Ellis County, Tex. Rex E. Willard. 1918.
660. Highway cost keeping. James J. Tobin and A. R. Losh. 1918.
661. The manufacture of casein from buttermilk or skim milk. Arnold O. Dahlberg. 1918.
662. Vesicular stomatitis of horses and cattle. John R. Mohler. 1918.
663. The installation and equipment of an egg breaking plant. M. K. Jenkins and M. E. Pennington. 1918.
664. The prevention of breakage of eggs in transit when shipped in car lots. M. E. Pennington, H. A. McAleer, A. D. Greenlee, F. X. Dailey, and H. C. Albin. 1918.
665. Status of farming in the lower Rio Grande irrigated district of Texas. Rex E. Willard. 1918.
666. The effect of alkali treatment on cocoons. Eugene Bloomberg. 1918.
667. Car-lot shipments of fruits and vegetables in the United States in 1916. Paul Froelich. 1918.
668. Nurse planting select cotton seed. P. V. Cardon. 1918.
669. The manufacture of Neufchatel and cream cheese in the factory. K. J. Matheson and E. R. Cammack. 1918.
670. The results of physical tests of road-building rock in 1916 and 1917. Prévost Hubbard and Frank H. Jackson, jr. 1918.
671. The diagnosis of bee diseases by laboratory methods. Arthur H. McCray and G. F. White. 1918.
672. The duck sickness in Utah. Alexander Wetmore. 1918.

673. Production of lumber, lath, and shingles in 1916. Franklin H. Smith and Albert H. Pierson. 1918.
674. Hemorrhagic septicemia. Henry J. Washburn. 1918.
675. Range preservation and its relation to erosion control on western grazing lands. Arthur W. Sampson and Leon H. Weyl. 1918.
676. The relation of the shrinkage and strength properties of wood to its specific gravity. J. A. Newlin and T. R. C. Wilson. 1919.
677. Soils of southern New Jersey and their uses. J. A. Bonsteel. 1918.
678. Influence of a city on farming. (A study of types of farms and their organizations in Jefferson County, Ky.) J. H. Arnold and Frank Montgomery. 1918.
679. The application of optical methods of identification to alkaloids and other organic compounds. Edgar T. Wherry. 1918.
680. Miscellaneous conifers of the Rocky Mountain region. George B. Sudworth. 1918
681. Grain-dust explosions, investigations in the experimental attrition mill at the Pennsylvania State College. B. W. Dedrick, R. B. Fehr, and David J. Price 1918.
682. A study of prices and quality of creamery butter. G. P. Warber. 1918.
683. Utilization of elm. W. D. Brush. 1918.
684. The sources of apple bitter-rot infections. John W. Roberts. 1918.
685. Honey bees and honey production in the United States. S. A. Jones. 1918.
686. Further studies of the rots of strawberry fruits. Nell E. Stevens and R. B. Wilcox. 1918.
687. Digestibility of some seed oils. A. D. Holmes. 1918.
688. Marketing berries and cherries by parcel post. C. C. Hawbaker and Charles A. Burmeister. 1918.
689. The southern green plant-bug. Thos. H. Jones. 1918.
690. Marketing practices of Wisconsin and Minnesota creameries. Roy C. Potts. 1918.
691. Typical specifications for bituminous road materials. Prévost Hubbard and Charles S. Reeve. 1918.
692. The agricultural species of bent grasses. Part I. Rhode Island bent and related grasses. Part II. The seeds of red top and other bent grasses. Charles V. Piper and F. H. Hillman. 1918.
693. Farm practice in growing sugar beets for three districts in Utah and Idaho, 1914–15. L. A. Moorhouse, T. H. Summers, R. S. Washburn, and James W. Jones. 1918.
694. A study of farm management problems in Lenawee County, Mich. H. M. Dixon and J. A. Drake. 1918.
695. Potatoes: Acreage, production, foreign trade, supply, and consumption. George K. Holmes. 1918.
696. Geographical phases of farm prices: Corn. L. B. Zapoleon. 1918.
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699. Analysis of experimental work with ground raw rock phosphate as a fertilizer. W. H. Waggaman, C. R. Wagner, and R. F. Gardiner. 1918.
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701. The chemical analysis of wheat-flour substitutes and the breads made therefrom. J. A. Le Clerc and H. L. Wessling. 1918.
702. Efficiency of commercial egg candling. M. K. Jenkins and C. A. Bengtson. 1918.
703. Miscellaneous truck-crop insects in Louisiana. I. Insects injurious to the globe artichoke in Louisiana. II. The granulated cutworm, an important enemy of the vegetable crop. III. Experiments in controlling the tomato fruit-worm with arsenicals. Thomas H. Jones. 1918.
704. Typical specifications for nonbituminous road materials. Prevost Hubbard and Frank H. Jackson, jr. 1918.
705. Profitable management of general farms in the Willamette Valley, Oreg. Byron Hunter and S. O. Jayne. 1918.
706. American sumac: A valuable tanning material and dyestuff. F. P. Veitch and J. S. Rogers. 1918.
707. Results of experiments with miscellaneous substances against bed-bugs, cockroaches, clothes moths, and carpet beetles. E. W. Scott, W. S. Abbott, and J. E. Dudley, jr. 1918.
708. Shuck protection for ear corn. C. H. Kyle. 1918.
709. Reports of storage holdings of certain food products. John O. Bell and I. C. Franklin. 1918.
710. Stagger grass (*Chrosperma muscaetoxicum*) as a poisonous plant. C. Dwight Marsh, A. B. Clawson, and Hadleigh Marsh. 1918.
711. Logging in the Douglas fir region. William H. Gibbons. 1918.
712. Apple powdery mildew and its control in the arid regions of the Pacific Northwest D. F. Fisher. 1918.
713. A study of farming in southwestern Kentucky. J. H. Arnold. 1918.
714. Spoilage of cranberries after harvest. C. L. Shear, Nell E. Stevens, R. B. Wilcox, and B. A. Rudolph. 1918.
715. Attracting birds to public and semipublic reservations. W. L. McAtee. 1918
716. A five-year farm management survey in Palmer Township, Washington County, Ohio, 1912–1916. H. W. Hawthorne. 1918.
717. Digestibility of protein supplied by soy-bean and peanut press-cake flours. Arthur D. Holmes. 1918.
718. Small sawmills: Their equipment, construction, and operation. Daniel F. Seerey 1918.
719. Women's rural organizations and their activities. Anne M. Evans. 1918.
720. Food habits of the mallard ducks of the United States. W. L. McAtee. 1918.
721. The beet-sugar industry in the United States. C. O. Townsend. 1918.
722. A study of heart rot in the western hemlock. James R. Weir and Ernest E. Hubert. 1918.
723. The pink bollworm, with special reference to steps taken by the Department of Agriculture to prevent its establishment in the United States. W. D. Hunter. 1918.

724. Drainage methods and foundations for county roads. E. W. James, Vernon M. Pierce, and Charles H. Moorefield. 1918.
725. A preliminary study of the bleaching of oats with sulphur dioxid. George H. Baston. 1918.
726. Farm practice in growing sugar beets for three districts in Colorado, 1914–15. L. A. Moorhouse, R. S. Washburn, T. H. Summers, and S. B. Nuckols. 1918.
727. Anthracnose of cucurbits. M. W. Gardner. 1918.
728. Certain desert plants as emergency stock feed. E. O. Wooton. 1918.
729. Suitable storage conditions for certain perishable food products: Apples, potatoes, sweet potatoes, onions, cabbage, eggs, poultry, butter, and fish. 1918.
730. Papers on deciduous-fruit insects. I. The grape curculio. Fred E. Brooks. II. The grape root-borer. Fred E. Brooks. III. Experiments in the control of the root form of the woolly apple aphis. B. R. Leach. 1918.
731. Recent experimental work on poisoning cotton-boll weevils. B. R. Coad. 1918.
732. Smyrna fig culture. G. P. Rixford. 1918.
733. Length of cotton lint, crops, 1916 and 1917. W. L. Pryor. 1918.
734. Nematode galls as a factor in the marketing and milling of wheat. D. A. Coleman and S. A. Regan. 1918.
735. Farm practice in growing sugar beets in the Billings region of Montana. S. B. Nuckols and E. L. Currier. 1918.
736. The open shed compared with closed barn for dairy cows. T. E. Woodward, W. F. Turner, W. R. Hale, and J. B. McNulty. 1918.
737. The tobacco beetle: An important pest in tobacco products. G. A. Runner and Adam G. Böving. 1919.
738. Effect of grazing upon western yellow pine reproduction in central Idaho. W. N. Sparhawk. 1918.
739. The significance of the colon count in raw milk. S. Henry Ayers and Paul W. Clemmer. 1918.
740. A study of some of the chemical changes which occur in oysters during their preparation for market. Edward E. Smith. 1919.
741. Effect of grazing upon aspen reproduction. Arthur W. Sampson. 1919.
742. Production of American Egyptian cotton. C. S. Scofield, T. H. Kearney, C. J. Brand, O. F. Cook, and W. T. Swingle. 1919.
743. The avocado in Guatemala. Wilson Popenoe. 1919.
744. Cooling milk and storing and shipping it at low temperatures. James A. Gamble and John T. Bowen. 1919.
745. Chopped soapweed as emergency feed for cattle on southwestern ranges. C. L. Forsling. 1919.
746. The sugar-cane moth borer. T. E. Holloway and U. C. Loftin. 1919.
747. The economical use of fuel in milk plants and creameries. John T. Bowen. 1919.
748. Farm practice in growing sugar beets in Michigan and Ohio. R. S. Washburn, L. A. Moorhouse, T. H. Summers, and C. O. Townsend. 1919.
749. Production of goats on far western ranges. W. R. Chapline. 1919.
750. A method for preparing a commercial grade of calcium arsenate. J. K. Haywood and C. M. Smith. 1918.
751. Experiments on the digestibility of wheat bran in a diet without wheat flour. Arthur D. Holmes. 1919.
752. The utilization of irrigated field crops for hog pasturing. F. D. Farrell. 1919.
753. The use of wood for fuel. 1919.
754. Inheritance of the waxy endosperm in maize. J. H. Kempton. 1919.
755. Geographical phases of farm prices: Oats. L. B. Zapoleon. 1919.
756. Pecan rosettes in relation to soil deficiencies. S. M. McMurran. 1919.
757. Farm practices in grain farming in North Dakota. C. M. Hennis and Rex E. Willard. 1919.
758. Pulpwood consumption and wood-pulp production in 1917. Franklin H. Smith. 1919.
759. The leaf-spot disease of alfalfa and red clover caused by the fungi *Pseudopeziza medicaginis* and *Pseudopeziza trifolii*, respectively. Fred Reuel Jones. 1919.
760. Farm practice in growing sugar beets in three California districts. T. H. Summers, L. A. Moorhouse, R. S. Washburn, and C. O. Townsend. 1919.
761. A comparison of concentrates for fattening steers in the South. W. F. Ward, S. S. Jerdan, and E. R. Lloyd. 1919.
762. A comparison of roughages for fattening steers in the South. W. F. Ward, Dan T. Gray, and E. R. Lloyd. 1919.
763. Lessons on dairying for rural schools. Alvin Dille. 1919.
764. Factors influencing the carrying qualities of American export corn. E. G. Boerner. 1919.
765. Strains of white burley tobacco resistant to root-rot. James Johnson and R. H. Milton. 1919.
766. A study of *Compsilura concinnata*, an imported tachinid parasite of the gipsy moth and the brown-tail moth. Julian J. Culver. 1919.
767. Oak-leaf poisoning of domestic animals. C. Dwight Marsh, A. B. Clawson, and Hadleigh Marsh. 1919.
768. Production of lumber, lath, and shingles in 1917. Franklin H. Smith and Albert H. Pierson. 1919.
769. The production and conservation of fats and oils in the United States. Herbert S. Bailey and B. E. Reuter. 1919.
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773. Chemical analyses of logan blackberry (loganberry) juices. R. S. Hollingshead. 1919.
774. Life history and habits of the mealy plum aphis. W. M. Davidson. 1919.
775. Commercial preservation of eggs by cold storage. M. K. Jenkins, 1919.
776. Cold storage reports, season 1917–1918. John O. Bell. 1919.

777. Fattening steers on summer pasture in the South. W. F. Ward, Dan T. Gray, and E. R. Lloyd. 1919.
778. The rose midge. E. R. Sasscer and A. D. Borden. 1919.
779. The grain bug. D. J. Caffrey and George W. Barber. 1919.
780. Nosema-disease. G. F. White. 1919.
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790. Range management on the national forests. James T. Jardine and Mark Anderson. 1919.
791. Plant succession in relation to range management. Arthur W. Sampson. 1919.
792. Report of storage holdings of certain food products during 1918. John O. Bell. 1919.
793. Lead poisoning in waterfowl. Alexander Wetmore. 1919.
794. Waterfowl and their food plants in the Sandhill region of Nebraska. Part I. Waterfowl in Nebraska. Harry C. Oberholser. Part II. Wild-duck foods in the Sandhill region of Nebraska. W. L. McAtee. 1920.
795. The adulteration of insect powder with powdered daisy flowers (*Chrysanthemum leucanthemum* L.) R. C. Roark and G. L. Keenan. 1919.
796. Use of toxic gases as a possible means of control of peach-tree borer. E. B. Blakeslee. 1919.
797. Commercial Dutch-bulb culture in the United States. David Griffiths and H. E. Juenemann. 1919.
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808. Studies on the life history and habits of the jointworm flies of the genus Harmolita (Isosoma) with recommendations for control. W. J. Phillips. 1920.
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810. European foulbrood. G. F. White. 1920.
811. A system of bookkeeping for grain elevators. B. B. Mason, Frank Robotka, and A. V. Swarthout. 1919.
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814. The standard day's work in central Illinois. Performance of implements and crews as indicated by reports from 600 farms in a typical corn-belt area. H. R. Tolley and L. M. Church. 1920.
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826. Generic classification of the Hemipterous family aphididae. A. C. Baker. 1920.
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833. Chrysanthemum midge. C. A. Weigel and H. L. Sanford. 1920.
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842. The nematode disease of wheat caused by *Tylenchus tritici*. L. P. Byars. 1920.
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846. Examination of frozen-egg products and interpretation of results. H. W. Redfield. 1920.
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891. The green June beetle. F. H. Chittenden and D. E. Fink. 1922.
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901. Grapevine flea-beetle. Dwight Isely. 1920.
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918. Report on investigations of the pink bollworm of cotton in Mexico. U. C. Loftin, K. B. McKinney, and W. K. Hanson. 1921.
919. Unit requirements for producing milk in western Washington. T. B. Bain and G. E. Braun. 1920.
920. Farm profits—figures from the same farms for a series of years. Washington County, Ohio; Clinton County, Ind.; and Dane County, Wis. H. M. Dixon and H. W. Hawthorne. 1920.
921. Sugar-cane juice clarification for sirup manufacture. J. K. Dale and C. S. Hudson. 1920.
922. Clover-leaf weevil. D. G. Tower and F. A. Fenton. 1920.
923. Unit requirements for producing market milk in Vermont. J. B. Bain, R. J. Posson, and Ralph P. Hotis. 1921.
924. Tear-stain of citrus fruits. John R. Winston. 1921.
925. A brachytic variation in maize. J. H. Kempton. 1921.
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940. The sporogenes test as an index of the contamination of milk. S. Henry Ayers and Paul W. Clemmer. 1921.
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946. Comparative spinning tests of Meade and sea-island cottons. Wm. R. Meadows and W. G. Blair. 1921.
947. Western sneezeweed (*Helenium hoopesii*) as a poisonous plant. C. Dwight Marsh, A. B. Clawson, James E. Couch, and Hadleigh Marsh. 1921.
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967. Results of work on blister beetles in Kansas. F. B. Milliken. 1921.
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969. The Mexican whorled milkweed (Asclepias mexicana) as a poisonous plant. C. Dwight Marsh and A. B. Clawson. 1921.
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973. Milk-plant operation. Clarence E. Clement. 1923.
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999. Prices of farm products in the United States. G. F. Warren. 1921.
1000. Labor and material requirements of field crops. L. A. Moorhouse and O. A. Juve. 1921.
1001. The relation of land tenure to the use of the arid grazing lands of the Southwestern States. E. O. Wooton. 1922.
1002. Open types of public markets. McFall Kerbey. 1921.
1003. The distillation of stumpwood and logging waste of western yellow pine. M. G. Donk, C. H. Shattuck, and W. D. Marshall. 1921.

1004. Use of water by spring wheat on the Great Plains. John S. Cole, O. R. Mathews, and E. G. Chilcott. 1923.
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1006. Accounting records for sampling apples by weight. J. H. Conn and A. V. Swarthout. 1921.
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1008. Rate of multiplication of the Hessian fly. W. R. McConnell. 1921.
1009. Volume variation of bottled foods. H. Runkel and J. C. Munch. 1921.
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1012. The death camas species, *Zygadenus paniculatus* and *Z. elegans*, as poisonous plants. C. Dwight Marsh and A. B. Clawson. 1922.
1013. The influence of relative humidity and moisture content of wheat on milling yields and moisture content of flour. J. H. Shollenberger. 1921.
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1035. The red spider on the avocado. G. F. Moznette. 1922.
1036. Coal tar and water-gas tar creosotes: Their properties and methods of testing. Ernest Bateman. 1922.
1037. The control of sap-stain, mold, and incipient decay in green wood with special reference to vehicle stock. Nathaniel O. Howard. 1922.
1038. Pecan rosette, its histology, cytology, and relations to other chlorotic diseases. Frederick V. Rand. 1922.
1039. Experiments with cereals on the Belle Fourche Experiment Farm, Newell, S. Dak. John H. Martin. 1922.
1040. Control of the citrophilus mealybug. R. S. Woglum and A. D. Borden. 1922.
1041. A study of sweet-potato varieties with special reference to their canning quality. C. A. Magoon and C. W. Culpepper. 1922.
1042. Effect of winter rations on pasture gains of calves: I. Winter rations and their influence on pasture gains of calves; II. Cost of rations for wintering calves. E. W. Sheets and R. H. Tuckwiller. 1922.
1043. Crop insurance; risks, losses, and principles of protection. V. N. Valgren. 1922.
1044. Self-service in the retailing of food products. F. E. Chaffee and McFall Kerbey. 1922.
1045. The sunflower as a silage crop. H. N. Vinall. 1922.
1046. Rust resistance in winter-wheat varieties. Leo E. Melchers and John H. Parker. 1922.
1047. Farm mortgage loans by banks, insurance companies, and other agencies. V. N. Valgren and Elmer E. Engelbert. 1921.
1048. Bank loans to farmers on personal and collateral security. V. N. Valgren and Elmer E. Engelbert. 1922.
1049. Game as a national resource. T. S. Palmer. 1922.
1050. The identification of true mahogany, certain so-called mahoganies, and some common substitutes. Arthur Koehler. 1922.
1051. Red cedar chests as protectors against moth damage. E. A. Back and Frank Rabak. 1922.
1052. Rations for feeding poultry in the packing house. J. S. Hepburn and R. C. Holder. 1922.
1053. Studies of certain fungi of economic importance in the decay of building timbers with special reference to the factors which favor their development and dissemination. Walter H. Snell. 1922.

1054. Comparison of corn oils obtained by expeller and benzol extraction methods. A. F. Sievers. 1922.
1055. Methods of manufacturing potato chips. Margaret Connor Vosbury. 1922.
1056. Marketing cotton seed for planting purposes. J. E. Barr. 1922.
1057. The chaulmoogra tree and some related species. A survey conducted in Siam, Burma, Assam, and Bengal. Joseph F. Rock. 1922.
1058. Sterility of oats. Charlotte Elliott. 1922.
1059. Research methods in the study of forest environment. Carlos G. Bates and Raphael Zon. 1922.
1060. Sitka spruce: Its uses, growth, and management. N. Leroy Carey. 1922.
1061. Longleaf pine. Wilbur R. Mattoon. 1922.
1062. Relation of the character of the endosperm to the susceptibility of dent corn to root rotting. John F. Trost. 1922.
1063. Sweet-potato storage studies. H. C. Thompson and James H. Beattie. 1922.
1064. Oleoresin production: A microscopic study of the effects produced on the woody tissues of Southern pines by different methods of turpentining. Eloise Gerry. 1922.
1065. The test weight of grain: A simple method of determining the accuracy of the testing apparatus. E. G. Boerner and E. H. Ropes. 1922.
1066. Curculios that attack the young fruits and shoots of walnut and hickory. Fred E. Brooks. 1922.
1067. Tests of drainage pumping plants in the Southern States. W. B. Gregory. 1922.
1068. Farm ownership and tenancy in the Black Prairie of Texas. J. T. Sanders. 1922.
1069. Relation of production to income from dairy cows. J. C. McDowell. 1922.
1070. Farm management in Catawba County, N. C. J. M. Johnson and E. D. Strait. 1922.
1071. Influence of season of freshening on production and income from dairy cows. J. C. McDowell. 1922.
1072. The handling, shipping, and cold storage of Bartlett pears in the Pacific Coast States. J. R. Magness. 1922.
1073. Some changes in the composition of California avocados during growth. C. G. Church and E. M. Chace. 1922.
1074. Classification of American wheat varieties. J. Allen Clark, John H. Martin, and Carleton R. Ball. 1922.
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1076. Biology of the lotus borer (*Pyrausta penitalis* Grote). George G. Ainslie and W. B. Cartwright. 1922.
1077. Portland cement concrete roads. James T. Voshell and R. E. Toms. 1922.
1078. Beaver habits, beaver control, and possibilities in beaver farming. Vernon Bailey. 1922.
1079. Experiments with spray solutions for preventing insect injury to green logs. F. C. Craighead. 1922.
1080. Effect of low temperature on the hatching of gipsy-moth eggs. John N. Summers. 1922.
1081. Biology of the papaya fruit fly, *Toxitrypana curvicauda*, in Florida. Arthur C. Mason. 1922.
1082. The production of tulip bulbs. David Griffiths. 1922.
1083. Farm and terminal market prices: Wheat, corn, and oats. Crop movement year, 1920–21. L. W. Strowbridge. 1922.
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1085. Broad-nosed grain weevil. Richard T. Cotton. 1922.
1086. Shrinkage of soft pork under commercial conditions. L. B. Burk. 1922.
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1090. The effects of inbreeding and crossbreeding on guinea pigs: I. Decline in vigor; II. Differentiation among inbred families. Sewall Wright. 1922.
1091. Life history of the kangaroo rat. Charles T. Vorhies and Walter P. Taylor. 1922.
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1095. Producers' cooperative milk-distributing plants. O. B. Jesness, W. H. Barber, A. V. Swartout, and C. E. Clement. 1922.
1096. By-products from crushing peanuts. J. B. Reed. 1922.
1097. The effect of silage on flavor and odor of milk. James A. Gamble and Ernest Keily. 1922.
1098. Impounding water in a bayou to control breeding of malaria mosquitoes. D. L. Van Dine. 1922.
1099. Frost injury to tomatoes. R. B. Harvey and R. C. Wright. 1922.
1100. Method of determining grease and dirt in wool. D. A. Spencer, J. I. Hardy, and Mary J. Brandon. 1922.
1101. Unit requirements for producing market milk in Delaware. J. B. Bain and Ralph P. Hotis. 1922.
1102. Kernel-spot of the pecan and its cause. J. B. Demaree. 1922.
1103. Summary of insect conditions throughout the United States during 1921. J. A. Hyslop. 1922.
1104. Internal browning of the yellow Newtown apple. W. S. Ballard, J. R. Magness, and Lon A. Hawkins. 1922.
1105. Natural reproduction of western yellow pine in the Southwest. G. A. Pearson. 1923.
1106. Legal phases of cooperative associations. L. S. Hulbert. 1922. Rev. 1923.
1107. The lead-cable borer or short-circuit beetle in California. H. E. Burke, R. D. Hartman, and T. E. Snyder. 1922.
1108. Tables for the microscopic identification of inorganic salts. William H. Fry. 1922.
1109. Sales methods and policies of a growers' national marketing agency. Asher Hobson and J. Burton Chaney. 1923.

1110. The farmer's short-box measuring flume. Carl Rohwer. 1922.
1111. One-variety cotton communities. O. F. Cook. 1922.
1112. The western yellow pine mistletoe. Effect on growth and suggestions for control. Clarence F. Korstian and W. H. Long. 1922.
1113. Development of cooperative shelter-belt demonstrations on the northern Great Plains. Robert Wilson and F. E. Cobb. 1923.
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1120. Investigations of heat canker of flax. C. S. Reddy and W. E. Brentzel. 1922.
1121. The effects of inbreeding and crossbreeding on guinea pigs: III. Crosses between highly inbred families. Sewall Wright. 1922.
1122. Absorption by colloidal and noncolloidal soil constituents. M. S. Anderson, W. H. Fry, P. L. Gile, H. E. Middleton, and W. O. Robinson. 1922.
1123. Proportioning the ingredients for ice cream and other frozen products by balance method. O. E. Williams. 1922.
1124. The marketing of mill feeds. G. C. Wheeler. 1922.
1125. The Saidy date of Egypt: A variety of first rank adapted to commercial culture in the United States. S. C. Mason. 1923.
1126. The effect of borax on the growth and yield of crops. J. J. Skinner, B. E. Brown, and F. R. Reid. 1923.
1127. Some new varieties of rice. Charles E. Chambliss and J. Mitchell Jenkins. 1923.
1128. Decays and discolorations in airplane woods. J. S. Boyce. 1923.
1129. Physical and chemical study of milo and feterita kernels. George L. Bidwell, Leslie E. Bopst, and John D. Bowling. 1922.
1130. Significance of wheat hairs in microscopical examination of flour. George L. Keenan. 1923.
1131. The formation and pathological anatomy of frost rings in conifers injured by late frosts. Arthur S. Rhoads. 1923.
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1134. Self-fertilization and cross-fertilization in Pima cotton. Thomas H. Kearney. 1923.
1135. Spinning tests of cotton compressed to different densities. William R. Meadows and William G. Blair. 1923.
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1141. Evaporation of fruits. Joseph S. Caldwell. 1923.
1142. Barrier factors in gipsy moth tree-handling material. M. T. Smulyan. 1923.
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1144. Cost of milk production on 48 Wisconsin farms. S. W. Mendum. 1923.
1145. Migration records from wild ducks and other birds banded in the Salt Lake Valley, Utah. Alexander Wetmore. 1923.
1146. The influence of copper sprays on yield and composition of Irish potato tubers. F. C. Cook. 1923.
1147. Chemical, physical, and insecticidal properties of arsenicals. F. C. Cook and N. E. Melindoo. 1923.
1148. Comparative spinning tests of superior varieties of cotton grown under weevil condition, in Southeastern States, crop of 1921. William R. Meadows and William G. Blair. 1923.
1149. Absorption and retention of hydrocyanic acid by fumigated food products [pt. 1]. (For pt. 2 see Bulletin 1307.) E. L. Griffin, I. E. Nelfert, N. Perrine, and A. B. Duckett. 1923.
1150. Accounting records and business methods for livestock shipping associations. Frank Robotka. 1923.
1151. Silver-fox farming. Frank G. Ashbrook. 1923.
1152. Soy and related fermentations. Margaret B. Church. 1923.
1153. Boll-weevil cotton in Texas. O. F. Cook. 1923.
1154. Feeding habits of the Japanese beetle which influence its control. Loren B. Smith. 1923.
1155. Rice experiments at the Biggs rice field station in California. Jenkin W. Jones. 1923.
1156. Investigations of potato wart. Freeman Weiss, C. R. Orton, and R. E. Hartman. 1923.
1157. Influence of spacing on productivity in single ear and prolific types of corn. E. B. Brown and H. S. Garrison. 1923.
1158. Production of sirup from sweet potatoes. H. C. Gore, H. C. Reese, and J. O. Reed. 1923.
1159. Coloring Satsuma oranges in Alabama. R. C. Wright. 1923.
1160. Studies on contact insecticides. Charles H. Richardson and C. R. Smith. 1923.
1161. Effect of composition on the palatability of ice cream. Owen E. Williams and George R. Campbell. 1923.
1162. The rôle of the genus *Rhamnus* in the dissemination of crown rust. S. M. Dietz. 1923.
1163. A study of decay in Douglas fir in the Pacific Northwest. J. S. Boyce. 1923.

1164. Segregation and correlation of characters in upland-Egyptian cotton hybrid. Thomas H. Kearney. 1923.
1165. Report on bird censuses in United States, 1916–1920. May Thacher Cooke. 1923.
1166. Apple by products as stock foods. G. P. Walton and G. L. Bidwell. 1923.
1167. Cultivation of the true yams in the Gulf region. Robert A. Young. 1923.
1168. Wearing qualities of shoe leathers. F. P. Veitch, R. W. Frey, and I. D. Clarke. 1923.
1169. Further studies with paradichlorobenzene for peach-borer control, with special reference to its use on young peach trees. Oliver I. Snapp and Charles H. Alden. 1923.
1170. Effects of different systems and intensities of grazing upon native vegetation at the Northern Great Plains Field Station. J. T. Sarvis. 1923.
1171. The manufacture of Camembert cheese. Kenneth J. Matheson and S. A. Hall. 1923.
1172. Cereal experiments at Chico, Calif. Victor H. Florell. 1923.
1173. Experiments in wheat production on the dry lands of the western United States. David E. Stephens, Max A. McCall, and Aaron E. Bracken. 1923.
1174. Hungarian vetch. Roland McKee and H. A. Schoth. 1923.
1175. Grain-sorghum experiments at the Woodward Field Station in Oklahoma. John B. Sieglinger. 1923.
1176. Some results of cutting in the Sierra forests of California. Duncan Dunning. 1923.
1177. Irrigation district operation and finance. Wells A. Hutchins. 1923.
1178. Bordeaux-oil emulsion. John R. Winston, John J. Bowman, and W. W. Yothers. 1923.
1179. Investigations of the manufacture of phosphoric acid by the volatilization process. William H. Waggaman, Henry W. Easterwood, and Thomas B. Turley. 1923.
1180. Field experiments with atmospheric-nitrogen fertilizers. F. E. Allison, J. M. Braham, and J. E. McMurtrey, jr. 1924.
1181. Labor requirements of Arkansas crops. A. D. McNair. 1924.
1182. The imported pine sawfly. William Middleton. 1923.
1183. Milling and baking experiments with American wheat varieties. J. H. Shollenberger and J. Allen Clark. 1924.
1184. Utilization of Pima cotton. Horace H. Willis. 1923.
1185. Flax-stem anatomy in relation to retting. Robert L. Davis. 1923.
1186. White-pine blister rust in western Europe. W. Stuart Moir. 1924.
1187. Experimental milling and baking (including chemical determinations). J. H. Shollenberger, Walter K. Marshall, and D. A. Coleman. 1924.
1188. Costs and farm practices in producing potatoes on 461 farms in Minnesota, Wisconsin, Michigan, New York, and Maine for the crop year 1919. W. C. Funk. 1924.
1189. Fruits in West Virginia, Kentucky, and Tennessee. George M. Darrow. 1923.
1190. Effect of feeding green alfalfa and green corn on flavor and odor of milk. C. J. Babcock. 1923.
1191. Potash from kelp: Early development and growth of giant kelp, *Macrocystis pyrifera*. R. P. Brandt and J. W. Turrentine. 1923.
1192. Improvement of Kubanka durum wheat by pure-line selection. Ralph W. Smith, L. W. Waldron and J. Allen Clark. 1923.
1193. Estimation of colloidal material in soils by adsorption. P. L. Gile, H. E. Middleton, W. D. Robinson, W. H. Fry, and M. S. Anderson. 1924.
1194. Chemical and structural study of mesquite, carob, and honey locust beans. G. P. Walton. 1923.
1195. Sterilities of wild and cultivated potatoes with reference to breeding from seed. A. B. Stout and C. F. Clark. 1924.
1196. Food and economic relations of North American grebes. Alexander Wetmore. 1924.
1197. Experiments with emmer, spelt, and einkorn. John H. Martin and Clyde E. Leighty. 1924.
1198. Cost of producing winter wheat in central Great Plains region of the United States. R. S. Washburn. 1924.
1199. List of bulletins of the agricultural experiment stations in the United States from their establishments to the end of 1920. 1924.
1199. Supplement 1. List of bulletins of agricultural experiment stations for the calendar years 1921 and 1922. Catherine E. Pennington. 1924.
1200. The natural regeneration of Douglas fir in the Pacific Northwest. Julius V. Hofmann. 1924.
1201. Plants tested for or reported to possess insecticidal properties. N. E. McIndoo and A. F. Sievers. 1924.
1202. Tractors and horses in the winter wheat belt, Oklahoma, Kansas, Nebraska. H. R. Tolley and W. R. Humphries. 1924.
1203. Experimental production of straw gas. Harry E. Roethe. 1923.
1204. Dusting cotton from airplanes. B. R. Coad, E. Johnson and G. L. McNeil. 1924.
1205. Dusting and spraying peach trees after harvest for control of the plum curculio. Oliver I. Snapp and C. H. Alden. 1924.
1206. Marketing southern-grown sweet potatoes. George O. Gatlin. 1924.
1207. Drainage district assessments. George R. Boyd and R. A. Hart. 1924.
1208. Effect of feeding turnips on the flavor and odor of milk. C. J. Babcock. 1923.
1209. Effects of selection on the yield of a cross between varieties of corn. Frederick D. Richey. 1924.
1210. Summary of literature on bunt, or stinking smut, of wheat. Horace M. Woolman and Harry B. Humphrey. 1924.
1211. Sources of supply and conditions of employment of harvest labor in the wheat belt. Don D. Lescohier. 1924.
1212. The woolly-pod-milkweed (*Asclepias eriocarpa*) as a poisonous plant. C. Dwight Marsh and A. B. Clawson. 1924.
1213. Digestibility of raw starches and carbohydrates. C. F. Langworthy and Alice Thompson Merrill. 1924.
1214. Family living in farm homes. An economic study of 402 farm families in Livingston Co., N. Y. E. L. Kirkpatrick, Helen W. Atwater, and Ilena M. Bailey. 1924.
1215. The Chinese jujube. C. C. Thomas and C. G. Church. 1924.
1216. Tentative standard methods of sampling and testing highway materials. 1924.

1217. Mixing emulsified mineral lubricating oils with deep-well waters and lime-sulphur solutions. W. W. Yothers and J. R. Winston. 1924.
1218. Horse-flies: Biologies and relation to western agriculture. J. L. Webb and R. W. Wells. 1924.
1219. Delinting and recleaning cottonseed for planting purposes. J. E. Barr. 1924.
1220. Farm labor in Massachusetts, 1921. Josiah C. Folsom. 1924.
1221. Capillary distribution of moisture in soil columns of small cross section. W. W. McLaughlin. 1924.
1222. Growth and feeding of honeybee larvae. James A. Nelson, Arnold P. Sturtevant, and Bruce Lineburg. 1924.
1223. The European elm scale in the West. Frank B. Herbert. 1924.
1224. Relation of land income to land value. Clyde H. Chambers. 1924.
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1228. Results of experiments with miscellaneous substances against the chicken mite W. M. Davidson. 1924.
1229. The stem nematode *Tylenchus dipsaci* on wild hosts in the Northwest. G. H. Godfrey and M. B. McKay. 1924.
1230. Conditions affecting the demand for harvest labor in the wheat belt. Don D. Lescohier. 1924.
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1232. Damage to termites in the Canal Zone and Panama and how to prevent it. Thomas E. Snyder and James Zetek. 1924.
1233. Forest types in the central Rocky Mountains as affected by climate and soil. Carlos G. Bates. 1924.
1234. Agricultural survey of Europe: The Danube Basin. Pt. 1. Louis G. Michael. 1924.
1235. Life history of codling moth in Yakima Valley of Washington. E. J. Newcomer and W. D. Whitcomb. 1924.
1236. Farming the logged-off uplands in western Washington. E. R. Johnson and E. D. Strait. 1924.
1237. Organization and development of a cooperative citrus-fruit marketing agency. A. W. McKay and W. Mackenzie Stevens. 1924.
1238. The canker worms. B. A. Porter and C. H. Alden. 1924.
1239. Studies in the physiology and control of bunt, or stinking smut, of wheat. Horace M. Woolman and Harry B. Humphrey. 1924.
1240. The meadow death camas (*Zygadenus venenosus*) as a poisonous plant. C. Dwight Marsh and A. B. Clawson. 1924.
1241. How the United States can meet its present and future pulp-wood requirements. Earle H. Clapp and Charles W. Boyce. 1924.
1242. Marketing cabbage. Alexander E. Cance and George B. Fiske. 1924.
1243. Studies of the Mexican bean beetle in the Southeast. Neale F. Howard and L. L. English. 1924.
1244. Forage crops in relation to the agriculture of the semiarid portion of the northern Great Plains. R. A. Oakley and H. L. Westover. 1924.
1245. Stock-poisoning plants of the range. C. D. Marsh. 1924.
1246. Market classes and grades of dressed beef. W. C. Davis and C. V. Whalin. 1924.
1247. Taros and yautias: Promising new food plants for the South. Robert A. Young. 1924
1248. Size of potato sets: Comparisons of whole and cut seed. William Stuart, P. M. Lombard, Margaret Connor Vosbury, G. Corder, W. C. Edmundson, C. F. Clark, and G. W. Dewey. 1924.
1249. Food habits of some winter bird visitants. Ira N. Gabrielson. 1924.
1250. Relation between the composition of California cantaloupes and their commercial maturity. E. M. Chace, C. G. Church, and F. E. Denny. 1924.
1251. Effect of winter rations on pasture gains of 2-year-old steers. E. W. Sheets and R. H. Tuckwiller. 1924.
1252. Prune and cherry brown-rot investigations in the Pacific Northwest. Charles Brooks and D. F. Fisher. 1924.
1253. Diseases of apples on the market. D. H. Rose 1924.
1254. Farm motor-truck operation in the New England and Central Atlantic States. L. M. Church. 1924.
1255. Inheritance of composition in fruit through vegetative propagation. Bud variants of Eureka and Lisbon lemons. E. M. Chace, C. G. Church, and F. E. Denny. Pp. 19. 1924.
1256. Tobacco diseases and their control. James Johnson. 1924.
1257. Land reclamation policies in the United States. R. P. Teele. 1924.
1258. Farm organization and management in Clinton Co., Ind. A business analysis of 100 farms in Forest and Johnson Townships for 8 years, 1910, and 1913–1919. H. W. Hawthorne and H. M. Dixon. 1924.
1259. Standard specifications for steel highway bridges. 1924.
1260. Sorghum experiments on the Great Plains. H. N. Vinall, R. E. Getty, and A. B. Cron. 1924.
1261. Operating methods and expense of cooperative citrus-fruit marketing agencies. A. W. McKay and W. Mackenzie Stevens. 1924.
1262. Effect of kiln drying, steaming, and air seasoning on certain fungi in wood. Ernest E. Hubert. 1924.
1263. Relative resistance of tree seedlings to excessive heat. Carlos G. Bates and Jacob Roeser, Jr. 1924.
1264. Forest planting in the intermountain region. C. F. Korstian and F. S. Baker.
1265. Scalding, precooking, and chilling, as preliminary canning operations. C. A. Magoon and C. W. Culpepper. 1924
1266. Agricultural cooperation in Denmark. Chris. L. Christensen. 1924.
1267. The rough-headed corn stalk-beetle. W. J. Phillips and Henry Fox. 1924.
1268. Returns from banded birds, 1920 to 1923. Frederick C. Lincoln. 1924.

1269. Relation of land tenure to plantation organization. C. O. Brannen. 1924.
1270. The production of narcissus bulbs. David Griffiths. 1924.
1271. A study of farm organization in southwestern Minnesota. George A. Pond and Jesse W. Tapp. 1924.
1272. Values of various new feeds for dairy cows. T. E. Woodward, H. T. Converse, W. R. Hale, and J. B. McNulty. 1924.
1273. The bud-moth. B. A. Porter. 1924.
1274. Cockleburs (species of Xanthium) as poisonous plants. C. Dwight Marsh, Glenwood C. Roe, and A. B. Clawson. 1924.
1275. Varietal susceptibility of oats to loose and covered smuts. George M. Reed, Marion A. Griffiths, and Fred N. Briggs. 1925.
1276. Varietal experiments with hard red winter wheats in the dry areas of the western United States. J. Allen Clark and John H. Martin. 1925.
1277. Input as related to output in farm organization and cost-of-production studies. H. R. Tolley, J. D. Black, and M. L. B. Ezekiel. 1924.
1278. Production of henequen fiber in Yucatan and Campeche. H. T. Edwards. 1924.
1279. Rural highway mileage, income, and expenditures, 1921 and 1922. Andrew P. Anderson. 1925.
1280. The computation of fertilizer mixtures from concentrated materials. Albert R. Merz and William H. Ross. 1924.
1281. Relative utilization of energy in milk production and body increase of dairy cows. J. August Fries, Winfred Walte Braman, and Donald C. Cochrane. 1924.
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1285. Truck-farm labor in New Jersey, 1922. Josiah C. Folsom. 1925.
1286. South American leaf disease of Para rubber. R. D. Rands. 1924.
1287. Experiments with cereals at the Akron (Colo.) Field Station in the 15-year period, 1908 to 1922, inclusive. Franklin A. Coffman. 1925.
1288. The control of tomato leaf-spot. Fred J. Pritchard and W. S. Porte. 1924.
1289. Common vetch and its varieties. Roland McKee and Harry A. Schoth. 1925.
1290. Transportation of citrus fruit from Porto Rico. R. G. Hill and Lon A. Hawkins. 1924.
1291. Aspen in Central Rocky Mountain region. Frederick S. Baker. 1925.
1292. Field and crop labor on Georgia farms (coastal plain area). L. A. Reynoldson. 1925.
1293. Tillage and rotation experiments at Dickinson, Hettinger, and Williston, N. Dak. Leroy Moomaw. 1925.
1294. The rôle of fire in the California pine forests. S. B. Show and E. I. Kotok. 1924.
1295. Land settlement and colonization in the Great Lakes States. John D. Black and L. C. Gray. 1925.
1296. A study of farm organization in central Kansas. W. E. Grimes, J. A. Hodges, R. D. Nichols, and Jesse W. Tapp. 1925.
1297. Effect of feeding cabbage and potatoes on flavor and odor of milk. C. J. Babcock. 1924.
1298. Control of decay in pulp and pulp wood. Otto Kress, C. J. Humphrey, C. A. Richards, M. W. Bray, and J. A. Staidl. 1925.
1299. Relative resistance of wheat to bunt in the Pacific Coast States. W. H. Tisdale, John H. Martin, Fred N. Briggs, W. W. Mackie, H. M. Woolman, D. E. Stephens, E. F. Gaines, and F. J. Stevenson. 1925.
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1301. Report of the Northern Great Plains Field Station for the 10-year period, 1913–1922, inclusive. J. M. Stephens, Robert Wilson, W. P. Baird, J. T. Sarvis, J. C. Thysell, T. K. Killand, and J. C. Brinsmade, jr. 1925.
1302. Development and present status of farmers' cooperative business organizations. R. H. Elsworth. 1924.
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1305. Utilization of almonds for various food products. A. F. Sievers and Frank Rabak. 1924.
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1309. Experiments with small grains on the Arlington Experiment Farm. John W. Taylor. 1925.
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1313. Fumigation against grain weevils with various volatile organic compounds. Ira E. Nelfert, F. C. Cook, R. C. Roark, W. H. Tonkin, E. A. Back, and R. T. Cotton. 1925.
1314. A bibliography relating to soil alkalies. Forest V. King, Guy Ervin, and O. Louise Evans. 1925.
1315. Dry farming in southeastern Wyoming. A. L. Nelson. 1925.
1316. Some effects of sodium arsenite when used to kill the common barberry. E. R. Schulz and Noel F. Thompson. 1925.
1317. Retail marketing of meats. Agencies of distribution, methods of merchandising, and operating expenses and profits. Herbert C. Marshall. 1925.
1318. Steer feeding in the sugar-cane belt. J. R. Quesenberry. 1925.
1319. Ginning pima cotton in Arizona. James S. Townsend. 1925.

1320. Behavior of cotton planted at different dates in weevil-control experiments in Texas and South Carolina. W. W. Ballard and D. M. Simpson. 1925.
1321. A statistical study of the relation between seed-ear characters and productiveness in corn. Frederick D. Richey and J. G. Willier. 1925.
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1329. Bamboos: Their culture and uses in the United States. B. T. Galloway. 1925.
1330. Abbreviations employed in Experiment Station Record for titles of periodicals. Frances A. Bartholow. 1925.
1331. The Madonna lily. David Griffiths. 1925.
1332. Emulsions of wormseed oil and of carbon disulfide for destroying larvae of the Japanese beetle in the roots of perennial plants. B. R. Lench and J. P. Johnson. 1925.
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1362. American fruit and produce auctions. Abner D. Miller and Charles W. Hauck. 1925.
1370. Sugar-cane sirup manufacture. H. S. Paine and C. F. Walton, jr. 1925.

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125. Protection of food products from injurious temperatures. H. E. Williams. 1901.
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127. Important insecticides. C. L. Marlatt. 1901. Revision of Farmers' Bulletin 19.
128. Eggs and their uses as food. C. F. Langworthy. 1901.
129. Sweet potatoes. D. M. Nesbit. 1901.
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131. Household tests for the detection of oleomargarine and renovated butter. G. E. Patrick. 1901.
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135. Sorghum sirup manufacture. A. A. Denton. 1901.
136. Earth roads. Maurice O. Eldridge. 1902.
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138. Irrigation in field and garden. E. J. Wickson. 1901.
139. Emmer: A grain for the semiarid regions. Mark Alfred Carleton. 1901.
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141. Poultry raising on the farm. D. E. Salmon. 1901.
142. Principles of nutrition and nutritive value of food. W. O. Atwater. 1902.

143. Conformation of beef and dairy cattle. Andrew M. Soule. 1902.
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145. Carbon bisulphid as an insecticide. W. E. Hinds. 1902.
146. Insecticides and fungicides. J. K. Haywood. 1902.
147. Winter forage crops for the South. Carleton R. Ball. 1902.
148. Celery culture. W. R. Beattie. 1902.
149. Experiment station work—XX. 1902.
150. Clearing new land. Franklin Williams, jr. 1902.
151. Dairying in the South. S. M. Tracy. 1902.
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153. Orchard enemies in the Pacific Northwest. C. V. Piper. 1902.
154. The home fruit garden: Preparation and care. L. C. Corbett. 1902.
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156. The home vineyard: With special reference to northern conditions. W. H. Ragan. 1902.
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158. How to build small irrigation ditches. C. T. Johnston and J. D. Stannard. 1902.
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160. Game laws for 1902. T. S. Palmer and H. W. Olds. 1902.
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163. Methods of controlling the boll weevil. W. D. Hunter. 1903.
164. Rape as a forage crop. A. S. Hitchcock. 1903.
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191. The cotton bollworm. A. L. Quaintance. 1904.
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193. Experiment station work—XXV. 1904.
194. Alfalfa seed. Edgar Brown. 1904.
195. Annual flowering plants. L. C. Corbett. 1904.
196. Usefulness of the American toad. A. H. Kirkland. 1904.
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203. Canned fruit, preserves, and jellies. Maria Parloa. 1905.
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223. Miscellaneous cotton insects in Texas. E. Dwight Sanderson. 1905.
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226. The relation of coyotes to stock raising in the West. David E. Lantz. 1905.
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228. Forest planting and farm management. George L. Clothier. 1905.
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231. Spraying for cucumber and melon diseases. W. A. Orton. 1905.
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235. Cement mortar and concrete. Philip L. Wormeley. 1905.
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246. Saccharine sorghums for forage. Carleton R. Ball. 1906. Supersedes Farmers' Bulletin 50.
247. The control of the codling moth and apple scab. C. L. Marlatt and W. A. Orton. 1906.
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252. Maple sugar and sirup. William F. Hubbard. 1906.
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256. Preparation of vegetables for the table. Maria Parloa. 1906.
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258. Texas or tick fever and its prevention. John R. Mohler. 1906.
259. Experiment station work—XXXV. 1906.
260. Seed of red clover and its impurities. Edgar Brown and F. H. Hillman. 1906. Supersedes Farmers' Bulletin 123.
261. The cattle tick and its relation to agriculture. August Mayer. 1906.
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263. Practical information for beginners in irrigation. S. Fortier. 1906.
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268. Industrial alcohol: Sources and manufacture. H. W. Wiley. 1906.
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270. Modern conveniences for the farm home. Elmina T. Wilson. 1906.
271. Forage crop practices in western Oregon and western Washington. Byron Hunter. 1906.
272. A successful hog and seed-corn farm. W. J. Spillman. 1906.
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274. Flax culture. William L. Marcy. 1907.
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276. Experiment station work—XXXIX. 1907.
277. The use of alcohol and gasoline in farm engines. S. M. Woodward. 1907.
278. Leguminous crops for green manuring. C. V. Piper. 1907.
279. A method of eradicating Johnson grass. J. S. Cates and W. J. Spillman. 1907.
280. A profitable tenant dairy farm. Lyman Carrier. 1907.
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282. Celery. W. R. Beattie. 1907.
283. Spraying for apple diseases and the codling moth in the Ozarks. W. M. Scott and A. L. Quaintance. 1907.
284. Insect and fungous enemies of the grape east of the Rocky Mountains. A. L. Quaintance and C. L. Shear. 1907.
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290. The cotton bollworm. F. C. Bishopp and C. R. Jones. 1907.
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294. Farm practice in the Columbia Basin uplands. Byron Hunter. 1907.
295. Potatoes and other root crops as food. C. F. Langworthy. 1907.
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297. Methods of destroying rats. David E. Lantz. 1907.
298. Food value of corn and corn products. Chas. D. Woods. 1907.
299. Diversified farming under the plantation system. D. A. Brodie and C. K. McClelland. 1907.

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300. Some important grasses and forage plants for the Gulf Coast region. S. M. Tracy. 1907.
301. Home-grown tea. George F. Mitchell. 1907.
302. Sea-island cotton: Its culture, improvement, diseases. W. A. Orton. 1907.
303. Corn-harvesting machinery. C. J. Zintheo. 1907.
304. Growing and curing hops. W. W. Stockberger. 1907.
305. Experiment station work—XLII. 1907.
306. Dodder in relation to farm seeds. F. H. Hillman. 1907.
307. Roselle: Its culture and uses. P. J. Webster. 1907.
308. Game laws for 1907. T. S. Palmer, Henry Oldys, and Chas. E. Brewster. 1907.
309. Experiment station work—XLIII. 1907.
310. A successful Alabama diversification farm. M. A. Crosby, J. F. Duggar, and W. J. Spillman. 1907.
311. Sand-clay and burnt-clay roads. William L. Spoon. 1907.
312. A successful southern hay farm. Harmon Benton. 1907.
313. Harvesting and storing corn. C. P. Hartley. 1907.
314. A method of breeding early cotton to escape boll weevil damage. R. L. Bennett. 1908.
315. Progress in legume inoculation. Karl F. Kellerman and T. R. Robinson. 1908.
316. Experiment station work—XLIV. 1908.
317. Experiment station work—XLV. 1908.
318. Cowpeas. H. T. Nelsen. 1908.
319. Demonstration work in cooperation with southern farmers. S. A. Knapp. 1908.
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321. The use of the split-log drag on earth roads. D. Ward King. 1908.
322. Milo as a dry-land grain crop. Carleton R. Ball and Arthur H. Leidigh. 1908.
323. Clover farming in the sandy jack-pine lands of the North. C. Beaman Smith. 1908.
324. Sweet potatoes. W. R. Beattie. 1908.
325. Small farms in the Corn Belt. J. A. Warren. 1908.
326. Building up a run-down cotton plantation. D. A. Brodie. 1908.
327. The conservation of natural resources. Gifford Pinchot. 1908.
328. Silver fox farming. Wilfred H. Osgood. 1908.
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330. Deer farming in the United States. D. E. Lantz. 1908.
331. Forage crops for hogs in Kansas and Oklahoma. C. E. Quinn. 1908.
332. Nuts and their uses as food. M. E. Jaffa. 1908.
333. Cotton wilt. W. A. Orton. 1908.
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335. Harmful and beneficial mammals of the arid interior. Vernon Bailey. 1908.
336. Game laws for 1908. T. S. Palmer and Henry Oldys. 1908.
337. Cropping systems for New England dairy farms. L. G. Dodge. 1908.
338. Macadam roads. Austin B. Fletcher. 1908.
339. Alfalfa. J. M. Westgate. 1908.
340. Declaration of governors for conservation of natural resources. 1908.
341. The basket willow. William F. Hubbard. 1909.
342. Experiment station work—XLIX. 1909.
343. The cultivation of tobacco in Kentucky and Tennessee. W. H. Scherffius, H. Woosley, and C. A. Mahan. 1909.
344. The boll weevil problem. W. D. Hunter. 1909.
345. Some common disinfectants. M. Dorset. 1909.
346. The computation of rations for farm animals by the use of energy values. Henry P. Armsby. 1909.
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348. Bacteria in milk. L. A. Rogers. 1909.
349. The dairy industry in the South. B. H. Rawl, Duncan Stuart, and George M. Whitaker. 1909.
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354. Onion culture. W. R. Beattie. 1909.
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356. Peanuts. W. R. Beattie. 1909. Supersedes Farmers' Bulletin 25.
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358. A primer of forestry. Part II. Practical forestry. Gifford Pinchot. 1909.
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361. Meadow fescue: Its culture and uses. H. N. Vinal. 1909.
362. Conditions affecting the value of market hay. Harry B. McClure. 1909.
363. The use of milk as food. R. D. Milner. 1909. Revision of Farmers' Bulletin 74.
364. A profitable cotton farm. C. L. Goodrich. 1909.
365. Farm management in northern potato-growing sections. Lawrence G. Dodge. 1909.
366. Experiment station work—LII. 1909.
367. Lightning and lightning conductors. Alfred J. Henry. 1909.
368. Eradication of bindweed or wild morning glory. H. R. Cox. 1909.
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372. Soy beans. C. V. Piper and H. T. Nielsen. 1909. Supersedes Farmers' Bulletin 58.
373. Irrigation of alfalfa. Samuel Fortier. 1909.
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375. Care of food in the home. Mary Hinman Abel. 1909.
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884. Experiment station work—LV. 1910.
885. Boys' and girls' agricultural clubs. F. W. Howe. 1910.
886. Potato culture on irrigated farms of the East. E. G. Grubb. 1910.
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889. Bread and bread making. Helen W. Atwater. 1910. Supersedes Farmers' Bulletin 112.
890. Pheasant raising in the United States. Henry Oldys. Diseases of pheasants. George Byron Morse. 1910.
891. Economical use of meat in the home. C. F. Langworthy and Caroline L. Hunt. 1910.
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898. Farm practice in the use of commercial fertilizers in the South Atlantic States. J. C. Beavers. 1910.
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911. Feeding hogs in the South. Dan T. Gray. 1910. Supersedes Farmers' Bulletin 100.
912. Experiment station work—LVIII. 1910.
913. The care of milk and its use in the home. George M. Whitaker, L. A. Rogers, and Caroline L. Hunt. 1910.
914. Corn cultivation. C. P. Hartley. 1910. Supersedes Farmers' Bulletin 199.
915. Seed corn. C. P. Hartley. 1911.
916. The production of cigar leaf tobacco in Pennsylvania. William Frear and E. K. Hibshman. 1910.
917. Rice culture. S. A. Knapp. 1910.
918. Game laws for 1910. Henry Oldys, C. E. Brewster, and F. L. Earnshaw. 1910.
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920. Oats: Distribution and uses. C. W. Warburton. 1910.
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926. Canning peaches on the farm. H. P. Gould and W. F. Fletcher. 1910.
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929. Industrial alcohol: Sources and manufacture. H. W. Wiley. Revised by H. E. Sawyer. 1911. Supersedes Farmers' Bulletin 268.
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931. The peanut. W. R. Beattie. 1911. Supersedes Farmers' Bulletin 350.
932. How a city family managed a farm. J. H. Arnold. 1911.
933. Cabbage. L. C. Corbett. 1911.
934. The home production of onion seed and sets. W. R. Beattie. 1911.
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936. Winter oats for the South. C. W. Warburton. 1911.
937. A system of tenant farming and its results. J. W. Froley and C. Beaman Smith. 1911.
938. Hog houses. J. A. Warren. 1911.
939. Anthrax: With special reference to its suppression. Henry J. Washburn. 1911.
940. Spraying peaches for control of brown rot, scab, and curculio. W. M. Scott and A. L. Quaintance. 1911.
941. Lespedeza or Japan clover. A. D. McNair and W. R. Mercier. 1911.
942. The treatment of bee diseases. E. F. Phillips. 1911.
943. Barley: Growing the crop. H. B. Derr. 1911
944. Remedies and preventives against mosquitoes. L. O. Howard. 1911.
945. Marketing eggs through the creamery. Rob. R. Slocum. 1911.
946. The choice of crops for alkali lands. Thomas H. Kearney. 1911.
947. Bees. E. F. Phillips. 1911. Supersedes Farmers' Bulletins 59 and 397.
948. Better grain-sorghum crops. Carleton R. Ball. 1911.
949. Rabies or hydrophobia. John R. Mohler. 1911.
950. Some facts about malaria. L. O. Howard. 1911.
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952. Capons and caponizing. Rob. R. Slocum 1911
953. Danger of general spread of the gipsy and brown-tail moths through imported nursery stock. C. L. Marlatt. 1911.

454. A successful New York farm. M. C. Burritt. 1911.
455. Red clover. J. M. Westgate and F. H. Hillman. 1911.
456. Our grosbeaks and their value to agriculture. W. L. McAtee. 1911.
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458. The best two sweet sorghums for forage. A. B. Conner. 1911.
459. House flies. L. O. Howard. 1911.
460. Frames as a factor in truck growing. W. R. Beattie. 1911.
461. The use of concrete on the farm. 1911.
462. The utilization of logged-off land for pasture in western Oregon and western Washington. Byron Hunter and Harry Thompson. 1911.
463. The sanitary privy. C. W. Stiles and L. L. Lumsden. 1911.
464. The eradication of quack-grass. J. S. Cates. 1911.
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466. Winter emmer. Mark Alfred Carleton. 1911.
467. The control of the chestnut bark disease. Haven Metcalf and J. Franklin Collins. 1911.
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470. Game laws for 1911. Henry Oldys, C. E. Brewster, and F. L. Earnshaw. 1911.
471. Grape propagation, pruning, and training. George C. Husmann. 1911.
472. Systems of farming in central New Jersey. George A. Billings and J. C. Beavers. 1911.
473. Tuberculosis. Prepared by Commission of the American Veterinary Medical Association. 1911.
474. The use of paint on the farm. Percy H. Walker. 1911.
475. Ice houses. L. C. Corbett. 1911.
476. The dying of pine in the Southern States: Cause, extent, and remedy. A. D. Hopkins. 1911.
477. Sorghum sirup manufacture. A. Hugh Bryan. 1912.
478. How to prevent typhoid fever. Logan Waller Page, John R. Mohler, Erwin F. Smith. 1911.
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480. Practical methods of disinfecting stables. George W. Pope. 1912.
481. Concrete construction on the livestock farm. 1912.
482. The pear and how to grow it. G. B. Brackett. 1912.
483. The thornless prickly pears. David Griffiths. 1912.
484. Some common mammals of western Montana in relation to agriculture and spotted fever. Clarence Birdseye. 1912.
485. Sweet clover. J. M. Westgate and H. N. Vinal. 1912.
486. Experiment station work—LXVIII. 1912.
487. Cheese and its economical use in the diet. C. F. Langworthy and Caroline L. Hunt. 1912.
488. Diseases of cabbage and related crops and their control. L. L. Harter. 1912.
489. Two dangerous imported plant diseases. Perley Spaulding and Ethel C. Field. 1912.
490. Bacteria in milk. L. A. Rogers. 1912.
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492. The more important insect and fungous enemies of the fruit and foliage of the apple. A. L. Quaintance and W. M. Scott. 1912.
493. The English sparrow as a pest. Ned Dearborn. 1912.
494. Lawn soils and lawns. Oswald Schreiner, J. J. Skinner, L. C. Corbett, and F. L. Mulford. 1912.
495. Alfalfa seed production. J. M. Westgate, Roland McKee, and M. W. Evans. 1912.
496. Raising Belgian hares and other rabbits. David E. Lantz. 1912.
497. Some common game, aquatic and rapacious birds in relation to man. W. L. McAtee and F. E. L. Beal. 1912.
498. Methods of exterminating the Texas fever tick. H. W. Graybill. 1912. Revision of Farmers' Bulletin 378.
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500. The control of the boll weevil. W. D. Hunter. 1912.
501. Cotton improvement under weevil conditions. O. F. Cook. 1912.
502. Timothy production on irrigated land in the Northwestern States. M. W. Evans. 1912.
503. Comb honey. Geo. S. Demuth. 1912.
504. Experiment station work—LXX. 1912.
505. Benefits of improved roads. 1912.
506. Food of some well-known birds of forest, farm, and garden. F. E. L. Beal and W. L. McAtee. 1912.
507. The smuts of wheat, oats, barley, and corn. Edward C. Johnson. 1912.
508. Market hay. Harry B. McClure. 1912.
509. Forage crops for the cotton region. S. M. Tracy. 1912.
510. Game laws for 1912. T. S. Palmer, C. E. Brewster, and Frank L. Earnshaw. 1912.
511. Farm bookkeeping. Edward H. Thomson. 1912.
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516. The production of maple sirup and sugar. A. Hugh Bryan and Wm. F. Hubbard. 1912.
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518. Winter barley. H. B. Derr. 1912.
519. An example of intensive farming in the Cotton Belt. M. A. Crosby. 1913.
520. The storage and marketing of sweet potatoes. W. R. Beattie. 1912.
521. Canning tomatoes at home and in club work. J. F. Breazeale and O. H. Benson. 1913.

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523. Tobacco curing. W. W. Garner. 1913.
524. Tile drainage on the farm. A. G. Smith. 1913.
525. Raising guinea pigs. David E. Lantz. 1913.
526. Mutton and its value in the diet. C. F. Langworthy and Caroline L. Hunt. 1913.
527. Experiment station work—LXXIV. 1913.
528. Hints to poultry raisers. Harry M. Lamon. 1913.
529. Vetch growing in the South Atlantic States. A. G. Smith. 1913.
530. Important poultry diseases. D. E. Salmon. 1913.
531. Larkspur, or "poison weed." C. Dwight Marsh, A. B. Clawson, and Hadleigh Marsh. 1913.
532. Experiment station work—LXXV. 1913.
533. Good seed potatoes and how to produce them. William Stuart. 1913.
534. Durum wheat. Cecil Salmon and J. Allen Clark. 1913.
535. Sugar and its value as food. Mary Hinman Abel. 1913.
536. Stock poisoning due to scarcity of food. C. Dwight Marsh. 1913.
537. How to grow an acre of corn. C. P. Hartley. 1913.
538. Sites, soils, and varieties of citrus groves in the Gulf States. P. H. Rolfs. 1913.
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543. Common white grubs. John J. Davis. 1913.
544. Potato-tuber diseases. W. A. Orton. 1913.
545. Controlling Canada thistles. H. R. Cox. 1913.
546. How to manage a corn crop in Kentucky and West Virginia. J. H. Arnold. 1913.
547. The yellow fever mosquito. L. O. Howard. 1913.
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550. Crimson clover: Growing the crop. J. M. Westgate. 1913.
551. The cultivation of American ginseng. Walter Van Fleet. 1913.
552. Kafir as a grain crop. Carleton R. Ball and Benton E. Rothgeb. 1913.
553. Pop corn for the home. C. P. Hartley and J. G. Willier. 1913.
554. Pop corn for the market. C. P. Hartley and J. G. Willier. 1913.
555. Cotton anthracnose and how to control it. W. W. Gilbert. 1913.
556. The making and feeding of silage. T. E. Woodward, George M. Rommel, W. F. Ward, and E. L. Shaw. 1913.
557. The potato-tuber moth. F. H. Chittenden. 1913.
558. Agricultural outlook: Weather conditions during the past month (August) with relation to crops. September, 1913.
559. Use of corn, kafir, and cowpeas in the home. C. F. Langworthy and Caroline L. Hunt. 1913.
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561. Bean growing in eastern Washington and Oregon and northern Idaho. Lee W. Elmharty. 1913.
562. The organization of boy's and girls' poultry clubs. Harry M. Lamon. 1913.
563. The agricultural outlook: Crop production in the United States. October, 1913.
564. The gipsy moth and the brown-tail moth, with suggestions for their control. A. F. Burgess. 1913.
565. Corn meal as a food and ways of using it. C. F. Langworthy and Caroline L. Hunt. 1914.
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567. Sugar-beet growing under irrigation. C. O. Townsend. 1914.
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569. Texas or tick fever. John R. Mohler. 1914.
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572. A system of farm cost accounting. C. E. Ladd. 1914.
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577. Growing Egyptian cotton in the Salt River Valley, Ariz. E. W. Hudson. 1914.
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580. Beef production in the South. W. F. Ward and Dan T. Gray. 1914.
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586. Collection and preservation of plant material for use in the study of agriculture. H. B. Derr and C. H. Lane. 1914.
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591. The classification and grading of cotton. D. E. Earle and W. S. Dean. 1914.
592. Stock-watering places on western grazing lands. Will C. Barnes. 1914.
593. How to use farm credit. T. N. Carver. 1914.
594. Shipping eggs by parcel post. Lewis B. Flohr. 1914.
595. Arsenate of lead as an insecticide against the tobacco hornworms in the dark tobacco districts. A. C. Morgan and D. C. Parman. 1914.
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598. The agricultural outlook. 1914.
599. Pasture and grain crops for hogs in the Pacific Northwest. Byron Hunter. 1914.
600. An outfit for boring taprooted stumps for blasting. Harry Thompson. 1914.
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603. Arsenical cattle dips. Robert M. Chapin. 1914.
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607. The farm kitchen as a workshop. Anna Barrows. 1914.
608. The removal of garlic flavor from milk and cream. S. Henry Ayers and W. T. Johnson. 1914.
609. Bird houses and how to build them. Ned Dearborn. 1914.
610. Wild onion: Methods of eradication. H. R. Cox. 1914.
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613. Goldenseal under cultivation. Walter Van Fleet. 1914.
614. A corn-belt farming system which saves harvest labor by hogging down crops. J. A. Drake. 1914.
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619. Breeds of draft horses. G. Arthur Bell. 1914.
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621. How to attract birds in northeastern United States. W. L. McAtee. 1915. Rev. 1921.
622. Basket willow culture. George N. Lamb. 1914.
623. Ice houses and the use of ice on the dairy farm. John T. Bowen and Guy M. Lambert. 1915.
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631. Growing peaches: Sites, propagation, planting, tillage, and maintenance of soil fertility. H. P. Gould. 1915.
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635. What the farm contributes directly to the farmers' living. W. C. Funk. 1914.
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643. Blackberry culture. George M. Darrow. 1915.
644. Manufacture and use of unfermented grape juice. George C. Husmann. 1915.
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650. The San José scale and its control. A. L. Quaintance. 1915.
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652. The sheep-killing dog. V. O. McWhorter. 1915.
653. Honey and its uses in the home. Caroline L. Hunt and Helen W. Atwater. 1915.
654. How farmers may improve their personal credit. C. W. Thompson. 1915.
655. Cottonseed meal for feeding beef cattle. W. F. Ward. 1915.
656. The community egg circle. C. E. Bassett. 1915.
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661. A method of analyzing the farm business. E. H. Thompson and H. M. Dixon. 1915.
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663. Drug plants under cultivation. W. W. Stockberger. 1915.
664. Strawberry growing in the South. H. C. Thompson. 1915.
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667. Breaking and training colts. V. G. Stambaugh. 1915.
668. The squash vine borer. F. H. Chittenden. 1915.
669. Fiber flax. Frank C. Miles. 1915.
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674. Control of the citrus thrips in California and Arizona. J. R. Horton. 1915.
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698. Trenching machinery used for the construction of trenches for tile drains. D. L. Yarnell. 1915.
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713. Sheep scab. Marlon Imes. 1916.
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715. Measuring and marketing woodlot products. Wilbur R. Mattoon and Wm. B. Barrows. 1916.
716. Management of sandy-land farms in northern Indiana and southern Michigan. J. A. Drake. 1916.
717. Food for young children. Caroline L. Hunt. 1916.
718. Cooperative livestock shipping associations. S. W. Doty and L. D. Hall. 1916.
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750. Roses for the home. F. L. Mulford. 1916.
751. Peanut oil. H. C. Thompson and H. S. Bailey. 1916.
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753. Commercial handling, grading, and marketing of potatoes. C. T. More and C. R. Derland. 1917.
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781. Tuberculosis of hogs. John R. Mohler and Henry J. Washburn. 1917.
782. Use of diary for farm accounts. E. H. Thomson. 1917.
783. Laws relating to fur-bearing animals, 1916. D. E. Lantz. 1916.
784. Anthrax or charbon. Henry J. Washburn. 1917.
785. Seed-flax production. Charles H. Clark. 1917.
786. Fall-sown grains in Maryland and Virginia. T. R. Stanton. 1917.
787. Sea-Island cotton. W. A. Orton. 1916.
788. The windbreak as a farm asset. Carlos G. Bates. 1917.
789. Mushroom pests and how to control them. C. H. Popenoe. 1917.
790. Contagious abortion of cattle. Adolph Eichhorn and George M. Potter. 1917.
791. Turkey raising. Andrew S. Weiant. 1917.
792. How Federal farm loan act benefits farmers. C. W. Thompson. 1917.
793. Foxtail millet: Its culture and utilization in the United States. H. N. Vinall. 1917.
794. Citrus fruit improvements: How to secure and use tree performance records. A. D. Shamel. 1917.
795. The domesticated silver fox. Ned Dearborn. 1917.
796. Some common edible and poisonous mushrooms. Flora W. Patterson and Vera K. Charles. 1917.
797. Sweet clover: Growing the crop. H. S. Coe. 1917.
798. Sheep tick and its eradication by dipping. Marion Imes. 1917.
799. Carbon disulphid as an insecticide. W. E. Hinds. 1917.
800. Grains for the dry lands of Oregon. L. R. Breithaupt. 1917.
801. Mites and lice on poultry. F. C. Bishopp and H. P. Wood. 1917.
802. Classification of American upland cotton. D. E. Earle and Fred Taylor. 1917.
803. Horse-breeding suggestions for farmers. H. H. Reese. 1917.
804. Aphids injurious to orchard fruits. Currant, gooseberry, and grape. A. L. Quaintance and A. C. Baker. 1917.
805. The drainage of irrigated farms. R. A. Hart. 1917.
806. Standard varieties of chickens. I. The American class. Rob R. Slocum. 1917.
807. Bread and bread making in the home. Caroline L. Hunt and Hannah L. Wessling. 1917.
808. How to select foods: I. What the body needs. Caroline L. Hunt and Helen W. Atwater. 1917.

809. Marketing livestock in the South: Suggestions for improvement. S. W. Doty. 1917.
810. Equipment for farm sheep raising. V. O. McWhorter. 1917.
811. Production of baby beef. S. H. Ray. 1917.
812. How livestock is handled in the bluegrass region of Kentucky. J. H. Arnold. 1917.
813. Construction and use of farm weirs. Victor M. Cone. 1917.
814. Bermuda grass. Samuel M. Tracy. 1917.
815. Organization, financing, and administration of drainage districts. H. S. Yohe. 1917.
816. Minor articles of farm equipment. H. N. Humphrey and A. P. Yerkes. 1917.
817. How to select foods: II. Cereals. Caroline L. Hunt and Helen W. Atwater. 1917.
818. Small vegetable garden: Suggestions for utilizing limited areas. 1917.
819. The tobacco budworm and its control in the southern tobacco districts. A. C. Morgan and F. L. McDonough. 1917.
820. Sweet clover: Utilization. H. S. Coe. 1917.
821. Watermelon diseases. W. A. Orton. 1917.
822. Livestock classifications at county fairs. S. H. Ray. 1917.
823. Sugar-beet sirup. C. O. Townsend and H. C. Gore. 1917.
824. How to select foods: III. Foods rich in protein. Caroline L. Hunt and Helen W. Atwater. 1917.
825. Pit silos. T. Pryse Metcalfe and George A. Scott. 1917.
826. Eradicating tall larkspur on cattle ranges in the national forests. A. E. Aldous. 1917.
827. Shallu, or "Egyptian wheat." Benton E. Rothgeb. 1917.
828. Farm reservoirs. Samuel Fortier. 1917.
829. Asparagus. H. C. Thompson. 1917.
830. Marketing eggs by parcel post. Lewis B. Flohr. 1917.
831. The red spider on cotton and how to control it. E. A. McGregor. 1917.
832. Trapping moles and utilizing their skins. With especial reference to the Pacific coast. Theo. H. Scheffer. 1917.
833. Methods of controlling or eradicating the wild oat in the hard spring wheat area. H. R. Cates. 1917.
834. Hog cholera: Prevention and treatment. M. Dorset and O. B. Hess. 1917.
835. How to detect outbreaks of insects and save the grain crops. W. R. Walton. 1917.
836. Sweet clover: Harvesting and thrashing the seed crop. H. S. Coe. 1917.
837. The asparagus beetles and their control. F. H. Chittenden. 1917.
838. Harvesting hay with the sweep-rake: A means by which eastern hay growers may save labor. Arnold P. Yerkes and H. B. McClure. 1917.
839. Home canning by the one-period cold-pack method. O. H. Benson. 1917.
840. Farm sheep raising for beginners. F. R. Marshall and R. B. Millin. 1917.
841. Drying fruits and vegetables in the home: With recipes for cooking. 1917.
842. Modern methods of protection against lightning. Roy N. Covert. 1917.
843. Important pecan insects and their control. John B. Gill. 1917.
844. How to attract birds in the Middle Atlantic States. W. L. McAtee. 1917.
845. The gipsy moth and the brown-tail and their control. A. F. Burgess. 1917.
846. The tobacco beetle and how to prevent damage by it. G. A. Runner. 1917.
847. Potato storage and storage houses. William Stuart. 1917.
848. The boll-weevil problem. With special reference to means of reducing damage. W. D. Hunter. 1917.
849. Capons and caponizing. Rob R. Slocum. 1917.
850. How to make cottage cheese on the farm. K. J. Matheson and F. R. Cammack. 1917.
851. The house fly. L. O. Howard and R. H. Hutchison. 1917.
852. Management of common storage houses for apples in the Pacific Northwest. H. J. Ramsey and S. J. Dennis. 1917.
853. Home canning of fruits and vegetables. Mary E. Creswell and Ola Powell. 1917.
854. Strawberry culture in Tennessee, Kentucky, and West Virginia. George M. Darrow. 1917.
855. Homemade silos. Helmer Rabild and K. E. Parks. 1917.
856. Control of diseases and insect enemies of the home vegetable garden. W. A. Orton and F. H. Chittenden. 1917.
857. Screw-worms and other maggots affecting animals. F. C. Bishopp, J. D. Mitchell, and H. C. Parman. 1917.
858. The guinea fowl. Andrew S. Weiant. 1917.
859. Home uses for Muscadine grapes. Charles Dearing. 1917.
860. Cranberry insect problems and suggestions for solving them. H. B. Scammell. 1917.
861. Removal of stains from clothing and other textiles. Harold L. Lang and Anna H. Whittelsey. 1917.
862. The common mealybug and its control in California. R. S. Woglum and J. D. Neuls. 1917.
863. Irrigation of grain. Walter W. McLaughlin. 1917.
864. Practical information for beginners in irrigation. Samuel Fortier. 1917.
865. Irrigation of alfalfa. Samuel Fortier. 1917.
866. The use of windmills in irrigation in the semiarid West. P. E. Fuller. 1917.
867. Tobacco hornworm insecticides: Recommendations for use of powdered arsenate of lead in dark-tobacco district. A. C. Morgan. 1917.
868. How to increase the potato crop by spraying. F. H. Chittenden and W. A. Orton. 1917.
869. The muskrat as a fur bearer: With notes on its use as food. David E. Lantz. 1917.
870. The community fair. J. Sterling Morton. 1917.
871. Fresh fruits and vegetables as conservers of other staple foods. Caroline L. Hunt. 1917.
872. The bollworm or corn earworm. F. C. Bishopp. 1917.
873. Utilization of farm wastes in feeding livestock. S. H. Ray. 1917.
874. Swine management. Revision of Farmers' Bulletin 205. George M. Rommel and F. G. Ashbrook. 1917.

875. The rough-headed corn-stalk beetle in the Southern States and its control. W. P. Phillips and Henry Fox. 1917. Rev. 1918.
876. Making butter on the farm. William White. 1917.
877. Human food from an acre of staple farm products. Morton O. Cooper and W. J. Spillman. 1917.
878. Grains for western North and South Dakota. F. Ray Babcock, John H. Martin, and Ralph W. Smith. 1917.
879. Home storage of vegetables. James H. Beattie. 1917.
880. Fumigation of ornamental greenhouse plants with hydrocyanic acid gas. E. R. Sasscer and A. D. Borden. 1917.
881. Preservation of vegetables by fermentation and salting. L. A. Round and H. L. Lang. 1917.
882. Irrigation of orchards. Samuel Fortier. 1917.
883. Grains for the Utah dry lands. Jenkin W. Jones and Aaron F. Bracken. 1917.
884. Saving vegetable seeds for the home and market garden. W. W. Tracy, sr. 1917.
885. Wheat growing in the Southeastern States. Clyde E. Leighty. 1917.
886. Harvesting soy-bean seed. W. J. Morse. 1917.
887. Raspberry culture. George M. Darrow. 1917.
888. Advice to forest planters in the plains region. Seward D. Smith. 1917.
889. Back-yard poultry keeping. Rob R. Slocum. 1917.
890. How insects affect the cotton plants and means of combating them. W. Dwight Pierce. 1917.
891. The corn root-aphis and methods of controlling it. John J. Davis. 1917.
892. Spring oat production. C. W. Warburton. 1917.
893. Breeds of dairy cattle. H. P. Davis. 1917.
894. Rye growing in the Southeastern States. Clyde E. Leighty. 1917.
895. Growing winter wheat on the Great Plains. E. C. Chilcott and John S. Cole. 1917.
896. House rats and mice. David E. Lantz. 1917.
897. Fleas and their control. Revision of Farmers' Bulletin 683. F. C. Bishopp. 1917.
898. Standard varieties of chickens: II. The Mediterranean and continental classes. Rob R. Slocum. 1917.
899. Surface irrigation for eastern farms. F. W. Stanley. 1917.
900. Homemade fruit butters. C. P. Close. 1917.
901. Everbearing strawberries. George M. Darrow. 1917.
902. The silverfish or "slicker": An injurious household insect. E. A. Back. 1917.
903. Commercial evaporation and drying of fruits. James H. Beattie and H. P. Gould. 1917.
904. Fire-prevention and fire fighting on the farm. H. R. Tolley and A. P. Yerkes. 1918.
905. Ways of making southern mountain farms more productive. J. H. Arnold. 1918.
906. The self-feeder for hogs. F. G. Ashbrook and R. E. Gongwer. 1917.
907. Bean growing in eastern Washington and Oregon and northern Idaho. Lee W. Fluharty and Byron Hunter. 1917. Revision of Farmers' Bulletin 561.
908. Information for fruit growers about insecticides, spraying apparatus, and important insect pests. A. L. Quaintance and E. H. Siegler. 1918.
909. Cattle lice and how to eradicate them. Marlon Imes. 1918.
910. Game laws for 1917. George A. Lawyer, W. F. Bancroft, and Frank L. Earnshaw. 1917.
911. Laws relating to fur-bearing animals, 1917. David E. Lantz. 1917.
912. How to attract birds in the East Central States. W. L. McAtee. 1918.
913. Killing hogs and curing pork. F. G. Ashbrook and G. A. Anthony. 1917.
914. Control of the melon aphis. F. H. Chittenden. 1918.
915. How to reduce weevil waste in southern corn. C. H. Kyle. 1918.
916. A successful community drying plant. C. W. Pugsley. 1917.
917. Growing peaches: Sites and cultural methods. (Revision and combination of F. B. 631 and 632.) H. P. Gould. 1918.
918. Peach varieties and their classification. H. P. Gould. 1918. Revision of Farmers' Bulletin 633.
919. The application of dockage in the marketing of wheat. Bureau of Markets. 1917.
920. Milk goats. Edward L. Shaw. 1918.
921. The principles of the liming of soils. Edmund C. Shorey. 1918.
922. Parcel post business methods. C. C. Hawbaker and John W. Law. 1918.
923. Fumigation of citrus trees. R. S. Woglum. 1918.
924. A simple way to increase crop yields. H. A. Miller. 1918.
925. Cabbage diseases. L. L. Harter and L. R. Jones. 1918.
926. Some common disinfectants. Revision of Farmers' Bulletin 345. M. Dorset. 1918.
927. Farm home conveniences. Madge J. Reese. 1918.
928. Control of the Argentine ant in orange groves. J. R. Horton. 1918.
929. The place of sheep on New England farms. F. H. Branch. 1918.
930. Marketing butter and cheese by parcel post. Lewis B. Flohr and Roy C. Potts. 1918.
931. Soy beans in systems of farming in the Cotton Belt. A. G. Smith. 1918.
932. Rodent pests of the farm. David E. Lantz. 1918.
933. Spraying for the control of insects and mites attacking citrus trees in Florida. W. W. Yothers. 1918.
934. Home gardening in the South. H. C. Thompson. 1918.
935. The sheep-killing dog. J. F. Wilson. 1918.
936. The city and suburban vegetable garden. H. M. Conolly. 1918.
937. The farm garden in the North. James H. Beattie. 1918.
938. Apple bitter rot and its control. John W. Roberts and Leslie Pierce. 1918.
939. Cereal smuts and the disinfection of seed grain. Harry B. Humphrey and Alden A. Potter. 1918.
940. Common white grubs. John J. Davis. 1918. Revision of Farmers' Bulletin 543.
941. Water systems for farm homes. George M. Warren. 1918.
942. Controlling the clover-flower midge in the Pacific Northwest. C. W. Creel and L. P. Rockwood. 1918.
943. Haymaking. H. B. McClure. 1918.

944. Controlling the garden webworm in alfalfa fields. E. O. G. Kelly and T. S. Wilson. 1918.
945. Eradication of Bermuda grass. Albert A. Hansen. 1918.
946. Care and repair of farm implements: No. 3. Plows and harrows. E. B. McCormick and L. L. Beebe. 1918.
947. Care and repair of farm implements: No. 4. Mowers, reapers, and binders. E. B. McCormick and L. L. Beebe. 1918.
948. The rag-doll seed tester: Its use in determining what ears of corn are fit for seed. George J. Burt, H. Howard Biggar, and Clement E. Trout. 1918.
949. Dehorning and castrating cattle. Frank W. Farley. 1918.
950. The southern corn root worm and farm practices to control it. Philip Luginbill. 1918.
951. Hog pastures for the Southern States. Lyman Carrier and F. G. Ashbrook. 1918.
952. Breeds of light horses. H. H. Reese. 1918.
953. Potato culture under irrigation. William Stuart, C. F. Clark, and George W. Dewey. 1918.
954. The disinfection of stables. George W. Pope. 1918. Revision of Farmers' Bulletin 480.
955. The use of wheat flour substitutes in baking. Hannah L. Wessling. 1918.
956. Curing hay on trucks. A method by which a good quality of hay may be cured during unfavorable weather. H. B. McClure. 1918.
957. Important poultry diseases. D. E. Salmon. 1918.
958. Standard broom corn. Benton E. Rothgeb. 1918.
959. The spotted garden slug. Wm. H. White. 1918.
960. Neufchatel and cream cheese: Farm manufacture and use. K. J. Matheson and F. R. Cammack. 1918.
961. Transferring bees to modern hives. E. L. Secrist. 1918.
962. Velvet beans. S. M. Tracy and H. S. Coe. 1918.
963. Tractor experience in Illinois. A study of the farm tractor under Corn Belt Conditions. Arnold P. Yerkes and L. M. Church. 1918.
964. Farm household accounts. W. C. Funk. 1918.
965. Growing grain sorghums in the San Antonio district of Texas. C. R. Letteer. 1918.
966. A simple hog-breeding crate. J. H. Zeller. 1918.
967. Purple vetch. Roland McKee. 1918.
968. Cultivation and utilization of barley. Harry V. Harlan. 1918.
969. Horse beans. Roland McKee. 1918.
970. Sweet-potato storage. H. C. Thompson. 1918.
971. The control of the clover-flower midge. C. W. Creel and L. P. Rockwood. 1918.
972. How to use sorghum grain. Carleton R. Ball and Benton E. Rothgeb. 1918.
973. The soy bean: Its culture and uses. W. J. Morse. 1918.
974. Clearing land. Earl D. Strait. 1918.
975. The control of European foulbrood. E. F. Phillips. 1918.
976. Cooling milk and cream on the farm. J. A. Gamble. 1918.
977. Hay caps. H. B. McClure. 1918.
978. Handling barnyard manure in eastern Pennsylvania. D. A. Brodie. 1918.
979. Preparation of strawberries for market. C. T. More and H. E. Truax. 1918.
980. The spinose ear tick and methods of treating infested animals. Marion Imes. 1918.
981. Farm practices that increase crop yields in Kentucky and Tennessee. J. H. Arnold. 1918.
982. Control of the green clover worm in alfalfa fields. Charles C. Hill. 1918.
983. Bean and pea weevils. E. A. Back and A. B. Duckett. 1918.
984. Farm and home drying of fruits and vegetables. Joseph S. Caldwell. 1918.
985. Systems of hog farming in the Southeastern States. E. S. Haskell. 1918.
986. Farm practices that increase crop yields in the Gulf Coast region. M. A. Crosby. 1918.
987. Labor saving practices in haymaking. H. B. McClure. 1918.
988. Larkspur, or "poison weed." C. Dwight Marsh, A. B. Clawson, and Hadleigh Marsh. 1918. Revision of Farmers' Bulletin 531.
989. Better use of man labor on the farm. H. R. Tolley and A. P. Yerkes. 1918.
990. Timothy. Morgan W. Evans. 1918.
991. The efficient operation of thrashing machines. H. R. Tolley. 1918.
992. The use of machinery in cutting corn. H. R. Tolley. 1918.
993. Cooperative bull associations. Joel G. Winkjer. 1918.
994. Commercial Bordeaux mixtures: How to calculate their values. Errett Wallace and L. H. Evans. 1918.
995. Preventing wood rot in pecan trees. S. M. McMurran. 1918.
996. Steam sterilization of seed beds for tobacco and other crops. E. G. Reinhart. 1918.
997. Terracing farm lands. C. E. Ramser. 1918.
998. Culture of the logan blackberry and related varieties. George M. Darrow. 1918.
999. Sweet-potato growing. Fred E. Miller. 1919.
1000. Crop systems for Arkansas. A. D. McNair. 1918.
1001. Growing fruit for home use. H. P. Gould and George M. Darrow. 1919.
1002. Canada thistle and methods of eradication. Albert A. Hansen. 1918.
1003. How to control billbugs destructive to cereal and forage crops. A. F. Satterthwait. 1919.
1004. The gas tractor in eastern farming. Arnold P. Yerkes and L. M. Church. 1918.
1005. Sweet clover on Corn Belt farms. J. A. Drake and J. C. Rundles. 1919.
1006. The wheat jointworm and its control. W. J. Phillips. 1918.
1007. Control of the onion thrips. F. H. Chittenden. 1919.
1008. Saving farm labor by harvesting crops with livestock. J. A. Drake. 1918.
1009. Haystackers: How they may be used in the East and South to save labor. H. B. McClure. 1919.
1010. Game laws for 1918. George A. Lawyer and Frank L. Earnshaw. 1918.
1011. The woolly white fly in Florida citrus groves. W. W. Yothers. 1919.
1012. The preparation of bees for outdoor wintering. E. F. Phillips and George S. Demuth. 1918.
1013. Practical hints on running a gas engine. A. P. Yerkes. 1919.
1014. Wintering bees in cellars. E. S. Phillips and George S. Demuth. 1918.

1015. Producing family and farm supplies on the cotton farm. C. L. Goodrich. 1919.
1016. Propagation and culture of the date palm. Bruce Drummond. 1919.
1017. Cattle scab and methods of control and eradication. Marion Imes. 1918.
1018. Hemorrhagic septicemia, stockyard fever, swine plague, fowl cholera, etc. Henry J. Washburn. 1918.
1019. Straining milk. Ernest Kelly and James A. Gamble. 1919.
1020. The sweet-potato weevil and its control. F. H. Chittenden. 1919.
1021. Alfalfa on Corn Belt farms. J. A. Drake, J. C. Rundles, and Ralph D. Jennings. 1919.
1022. Laws relating to fur-bearing animals. 1918. David E. Lantz. 1918.
1023. Machinery for cutting firewood. H. R. Tolley. 1919.
1024. Currants and gooseberries. George M. Darrow. 1919.
1025. The larger corn stalk-borer. George G. Ainslie. 1919.
1026. Strawberry culture: South Atlantic and Gulf Coast regions. George M. Darrow. 1919.
1027. Strawberry culture: Western United States. George M. Darrow. 1919.
1028. Strawberry culture: Eastern United States. George M. Darrow. 1919.
1029. Conserving corn from weevils in the Gulf Coast States. E. A. Back. 1919.
1030. Feeding horses. G. A. Bell and J. O. Williams. 1919.
1031. Fig growing in the South Atlantic and Gulf States. H. P. Gould. 1919.
1032. Operating a cooperative motor truck route. H. S. Yohe. 1919.
1033. Muscadine grape paste. Charles Dearing. 1919.
1034. Growing sugar cane for sirup. P. A. Yoder. 1919.
1035. The farm tractor in the Dakotas. Arnold P. Yerkes and L. M. Church. 1919.
1036. Care and repair of farm implements: No. 5, Grain separators. Elmer Johnson. 1919.
1037. "White ants" as pests in the United States and methods of preventing their damage. T. E. Snyder. 1919.
1038. The striped cucumber beetle and its control. F. H. Chittenden. 1919.
1039. Commercial comb honey production. George S. Demuth. 1919.
1040. Illustrated poultry primer. Harry M. Lamon and Jos. Wm. Kinghorne. 1919.
1041. The celworm disease of wheat and its control. Luther P. Byars. 1919.
1042. Saving man labor in sugar-beet fields. L. A. Moorhouse and T. H. Summers. 1919.
1043. Strawberry varieties in the United States. George M. Darrow. 1919.
1044. The city home garden. W. R. Beattie. 1919.
1045. Laying out fields for tractor plowing. H. R. Tolley. 1919.
1046. The European corn borer: A menace to the country's corn crop. D. J. Caffrey. 1919.
1047. Dry farming for better wheat fields. The Columbia and Snake River Basins. Byron Hunter. 1919.
1048. Rhodes grass. S. M. Tracy. 1919.
1049. Baling hay. H. B. McClure. 1919.
1050. Handling and loading southern new potatoes. A. M. Grimes. 1919.
1051. Sheep on irrigated farms in the Northwest. Stephen O. Jayne. 1919.
1052. Standard varieties of chickens. III. The Asiatic, English, and French classes. Rob R. Slocum. 1919.
1053. Control of cherry leaf-spot. John W. Roberts and Leslie Pierce. 1919.
1054. The loco-weed disease. C. Dwight Marsh. 1919.
1055. Country hides and skins. R. W. Hickman, C. V. Whalin, R. W. Frey, and F. P. Veitch. 1919. Revised. 1922.
1056. Controlling important fungous and insect enemies of the pear in the humid sections of the Pacific Northwest. D. F. Fisher and E. J. Newcomer. 1919.
1057. Cattle-fever ticks and methods of eradication. W. P. Ellenberger and Robert M. Chapin. 1919.
1058. Destroy the common barberry. E. C. Stakman. 1919.
1059. Sweet-potato diseases. L. L. Harter. 1919.
1060. Onion diseases and their control. J. C. Walker. 1919.
1061. Harlequin cabbage bug and its control. F. H. Chittenden. 1920.
1062. Buckwheat. Clyde E. Leighty. 1919.
1063. Take-all and flag smut: Two wheat diseases new to the United States. Harry B. Humphrey and Aaron G. Johnson. 1919.
1064. Production of late or main crop potatoes. William Stuart. 1919. Rev. 1920.
1065. The flat-headed apple-tree borer. Fred E. Brooks. 1919.
1066. Determining the age of cattle by the teeth. George W. Pope. 1919.
1067. Feeding hens for egg production. Harry M. Lamon and Alfred R. Lee. 1919.
1068. Judging beef cattle. E. H. Thompson. 1919.
1069. Tuberculosis in live stock. Detection, control, and eradication. John A. Kiernan and Alexander E. Wight. 1919.
1070. The fowl tick and how premises may be freed from it. F. C. Bishopp. 1919.
1071. Making woodlands profitable in the Southern States. Wilbur R. Mattoon. 1920.
1072. Prickly pear as stock feed. David Griffith. 1920.
1073. Growing beef on the farm. F. W. Farley. 1919.
1074. The bean ladybird and its control. F. H. Chittenden. 1919.
1075. Unfermented grape juice: How to make it in the home. Charles Dearing. 1919.
1076. California oak worm. H. E. Burke and F. B. Herbert. 1920.
1077. Game laws for 1919. Geo. A. Lawyer and Frank L. Earnshaw. 1919.
1078. Harvesting and storing ice on the farm. John T. Bowen. 1920.
1079. Laws relating to fur-bearing animals, 1919. George A. Lawyer, Frank L. Earnshaw, and Ned Dearborn. 1919.
1080. Preparation of barreled apples for market. W. M. Scott, H. C. Hetzel, H. W. Samson, and M. Stockton. 1919.
1081. Cranberry diseases and their control. C. L. Shear. 1920.
1082. Home supplies furnished by the farm. W. C. Funk. 1920.
1083. The Hessian fly and how to prevent losses from it. W. R. Walton. 1920.
1084. Control of American foulbrood. E. F. Phillips. 1920.
1085. Hog-lice and hog mange. Methods of control and eradication. Marion Imes. 1920.
1086. How insects affect the rice crop. J. L. Webb. 1920.

1087. Beautifying the farmstead. F. L. Mulford. 1920.
1088. Selecting a farm. E. H. Thomson. 1920.
1089. Selection and care of clothing. Laura I. Baldt. 1920.
1090. Rabbit raising. Ned Dearborn. 1920.
1091. Protection of potatoes from cold in transit—Lining and loading cars. 1920.
1092. Prairie rice culture in the United States. Charles E. Chambliss. 1920.
1093. Influence of the tractor on use of horses. L. A. Reynoldson. 1920.
1094. The alfalfa caterpillar. V. L. Wildermuth. 1920.
1095. Beet-top silage and other by-products of the sugar beet. James W. Jones. 1919.
1096. Frost and the prevention of damage by it. 1920.
1097. The stable fly: How to prevent its annoyance and its losses to livestock. F. C. Bishopp. 1920.
1098. Dusting machinery for cotton boll weevil control. Elmer Johnson and B. R. Coad. 1920.
1099. Home laundering. Lydia Ray Balderston. 1920.
1100. Cooperative marketing of woodland products. A. F. Hawes. 1920.
1101. The Argentine ant as a household pest. E. R. Barber. 1920.
1102. The crow in its relation to agriculture. Is it a farm pest? E. R. Kalmbach. 1920.
1103. Growing irrigated grain in southern Idaho. L. C. Aicher. 1920.
1104. Book-lice, or psocids. E. A. Back. 1920.
1105. Care of mature fowls. Alfred R. Lee. 1920.
1106. Incubation of hens' eggs. Harry M. Lamon. 1920.
1107. Brood coops and appliances. D. M. Green. 1920.
1108. Care of baby chicks. Alfred R. Lee. 1920.
1109. Preserving eggs. Jos. Wm. Kinghorne. 1920.
1110. Lice, mites, and cleanliness. J. W. Kinghorne and D. M. Green. 1920.
1111. Management of growing chicks. J. W. Kinghorne. 1920.
1112. Culling for eggs and market. Rob R. Slocum. 1920.
1113. Poultry houses. Alfred R. Lee. 1920.
1114. Common poultry diseases. D. M. Green. 1920.
1115. Selection and preparation of fowls for exhibition. Jos. Wm. Kinghorne. 1920.
1116. Selection and care of poultry breeding stock. Rob R. Slocum. 1920.
1117. Forestry and farm income. Wilbur R. Mattoon. 1920.
1118. Dockage under the Federal wheat grades. Ralph H. Brown. 1920.
1119. Fall-sown oats. C. W. Warburton and T. R. Stanton. 1920.
1120. Control of apple powdery mildew. D. F. Fisher. 1920.
1121. Factors that make for success in farming in the South. C. L. Goodrich. 1920.
1122. Citrus-fruit growing in the Gulf States. E. D. Vosbury. 1920.
1123. Growing and planting hardwood seedlings on the farm. C. R. Tillotson. 1920.
1124. The brown spot of corn with suggestions for its control. W. H. Tisdale. 1920.
1125. Forage for the Cotton Belt. S. M. Tracy. 1920.
1126. Sudan grass. H. N. Vinall. 1920.
1127. Peanut growing for profit. W. R. Beattie. 1920.
1128. Control of aphids injurious to orchard fruits, currant, gooseberry, and grape. A. L. Quaintance and A. C. Baker. 1920.
1129. Diseases of southern pecans. S. M. McMurran and J. B. Demaree. 1920.
1130. Carpet grass. C. V. Piper and Lyman Carrier. 1920.
1131. Tile-trenching machinery. D. L. Yarnell. 1920.
1132. Planning the farmstead. M. C. Betts and W. R. Humphries. 1920.
1133. Feeding garbage to hogs. F. G. Ashbrook and A. Wilson. 1920.
1134. Castrating and docking lambs. G. H. Bedell and E. W. Baker. 1920.
1135. The beef calf: Its growth and development. E. W. Sheets. 1920.
1136. Baking in the home. Hannah L. Wessling. 1920.
1137. Grain sorghums: How to grow them. Benton E. Rothgeb. 1920.
1138. Game laws for 1920. Geo. A. Lawyer and Frank L. Earnshaw. 1920.
1139. A method of analyzing the farm business. H. M. Dixon and H. W. Hawthorne. 1920.
1140. Grasshopper control in the Pacific States. T. D. Urbahns. 1920.
1141. Rice growing in California. Charles E. Chambliss. 1920.
1142. Growing crimson clover. L. W. Kephart. 1920.
1143. Lespedeza as a forage crop. Lyman Carrier. 1920.
1144. Cooperative marketing. O. B. Jesness. 1920.
1145. Handling and transportation of cantaloupes. A. W. McKay, G. L. Fischer, and A. E. Nelson. 1921.
1146. Dourine of horses. J. R. Mohler and H. W. Schoening. 1920.
1147. Milo, a valuable grain crop. Benton E. Rothgeb. 1920.
1148. Cowpeas: Culture and varieties. W. J. Morse. 1920.
1149. Growing corn in the Southeastern States. C. H. Kyle. 1920.
1150. Parasites and parasitic diseases of sheep. Maurice C. Hall. 1920.
1151. Alsike clover. A. J. Pieters. 1920.
1152. Sugar-beet seed growing in the Rocky Mountain States. W. W. Tracy, jr. 1920.
1153. Cowpeas: Utilization. W. J. Morse. 1920.
1154. The aspen borer and how to control it. George Hofer. 1920.
1155. Diseases of sheep. Bernard A. Gallagher. 1921.
1156. Angoumois grain moth. E. A. Back. 1920.
1157. Waterproofing and mildewproofing of cotton duck. H. P. Holman, B. S. Levine, and T. D. Jarrell. 1920.
1158. Growing and utilizing sorghums for forage. H. N. Vinall and R. E. Getty. 1920.
1159. Fermented pickles. Edwin LeFevre. 1920.
1160. Diseases of apples in storage. Charles Brooks, J. S. Cooley, and D. F. Fisher. 1920.
1161. Dodder. Albert A. Hansen. 1921.
1162. Proso or hog millet. John H. Martin. 1920.
1163. Dry farming in western South Dakota. O. R. Mathews. 1920.
1164. The farm lease contract. L. C. Gray and Howard A. Turner. 1920.
1165. Laws relating to fur-bearing animals, 1920. George A. Lawyer, Frank L. Earnshaw, and Ned Dearborn. 1920.

1166. Poison ivy and poison sumac and their eradication. C. V. Grant and A. A. Hansen. 1920.
1167. Essentials of animal breeding. George M. Rommel. 1920.
1168. Varieties of winter wheat adapted to the eastern United States. Clyde E. Leighty. 1921.
1169. Insects injurious to deciduous shade trees and their control. Jacob Kotinsky. 1921.
1170. Meadows for the Northern States. C. V. Piper and Lyman Carrier. 1920.
1171. Growing annual flowering plants. L. C. Corbett and F. L. Mulford. 1921.
1172. Farm slaughtering and use of lamb and mutton. C. G. Potts. 1920.
1173. Plans of rural community buildings. W. C. Nason and C. J. Galpin. 1921.
1174. One-register furnaces (pipeless furnaces). A. M. Daniels. 1920.
1175. Better seed corn. C. P. Hartley. 1920.
1176. Control of the root, stalk, and ear rot diseases of corn. James R. Holbert and George N. Hoffer. 1920.
1177. The care and improvement of the farm woods. C. R. Tillotson. 1920.
1178. Tree surgery. J. Franklin Collins. 1920.
1179. Feeding cottonseed products to livestock. E. W. Sheets and E. H. Thompson. 1920. Rev. 1924.
1180. Housecleaning made easier. Sarah J. McLeod. 1921.
1181. Raising sheep on temporary pastures. F. R. Marshall and C. G. Potts. 1921.
1182. Farm inventories. J. S. Ball. 1920.
1183. The care of leather. F. P. Veitch, H. P. Holman, and R. W. Frey. 1920.
1184. Ginseng culture. W. W. Stockberger. 1921.
1185. Spraying for the alfalfa weevil. Geo. I. Reeves, T. R. Chamberlin, and K. M. Pack. 1920.
1186. Pork on the farm. Killing, curing, and canning. F. G. Ashbrook, G. A. Anthony, and Franz P. Lund. 1921.
1187. Cotton diseases and their control. W. W. Gilbert. 1921.
1188. The southern pine beetle. A menace to the pine timber of the Southern States. A. D. Hopkins. 1921.
1189. Handling spinach for long-distance shipment. V. W. Ridley. 1921.
1190. How to grow an acre of potatoes. William Stuart. 1921.
1191. Making American cheese on the farm. C. M. Gere. 1921.
1192. Organization of rural community buildings. W. C. Nason. 1921.
1193. The beet leaf-beetle and its control. F. H. Chittenden. 1921.
1194. Operating a home heating plant. A. M. Daniels. 1921.
1195. Rice as food. 1921.
1196. Standard containers for fruits and vegetables. F. P. Downing. 1921.
1197. Protection of mesquite cordwood and posts from borers. F. C. Craighead and George Hofer. 1921.
1198. Swarm control. Geo. S. Demuth. 1921.
1199. Judging sheep. G. H. Bedell. 1921.
1200. Tuberculosis of fowls. Bernard A. Gallagher. 1921.
1201. Motor trucks on eastern farms. H. R. Tolley and L. M. Church. 1921.
1202. An agricultural almanac for 1921. Bristow Adams.
1203. The angora goat. G. P. Williams. 1921.
1204. Northwestern apple packing houses. Raymond R. Pailthorp and Harold W. Samson.
1205. Potato production in the South. William Stuart. 1921.
1206. Corn earworm as an enemy of vetch. Philip Luginbill and A. H. Beyer. 1921.
1207. Milk and its uses in the home. 1921.
1208. Trees for town and city streets. F. L. Mulford. 1922.
1209. Planting and care of street trees. F. L. Mulford. 1921.
1210. Measuring and marketing farm timber. Wilbur R. Mattoon and William B. Barrows. 1921.
1211. Home canning of fruits and vegetables. 1921.
1212. Straighthead of rice and its control. W. H. Tisdale and J. Mitchell Jenkins. 1921.
1213. Flag smut of wheat and its control. W. H. Tisdale and Marion A. Griffiths. 1921.
1214. Farm dairy houses. Ernest Kelly and K. E. Parks. 1921.
1215. Beekeeping in the clover region. E. F. Phillips and George S. Demuth. 1922.
1216. Beekeeping in the buckwheat region. E. F. Phillips and George S. Demuth. 1922.
1217. The green bug or spring grain-aphis: How to prevent its periodical outbreaks. W. R. Walton. 1921.
1218. Beef production in the Corn Belt. W. H. Black. 1921.
1219. Floors and floor coverings. 1921.
1220. Insect and fungous enemies of the grape. A. L. Quaintance and C. L. Shear. 1921.
1221 Standard varieties of chickens. IV. The ornamental breeds and varieties. Rob R. Slocum. 1921.
1222. Beekeeping in the tulip-tree region. E. F. Phillips and George S. Demuth. 1922.
1223. The chinch bug and its control. J. R. Horton and A. F. Satterthwait. 1922.
1224. Wheat scab and its control. Aaron G. Johnson and James G. Dickson. 1921.
1225. The potato leafhopper and its control. J. E. Dudley, jr. 1921.
1226. Take-all of wheat and its control. Harry B. Humphrey, Aaron G. Johnson, and Harold H. McKinney. 1921.
1227. Sewage and sewerage of farm homes. George M Warren. 1922.
1228. A week's food for an average family. Caroline L. Hunt. 1921.
1229. Utilization of alfalfa. R. A. Oakley and H. L. Westover. 1921.
1230. Chimneys and fireplaces. A. M. Daniels. 1921
1231. Drying crude drugs. G. A. Russell. 1921.
1232. Seed marketing hints for the farmer. George C. Edler. 1921.
1233. Tomatoes for canning and manufacturing. James H. Beattie. 1921.
1234. Gullies. How to control and reclaim them. C. E. Ramser. 1922.
1235. Game laws for 1921. Geo. A. Lawyer and Frank L. Earnshaw. 1921.
1236 Corn and its uses as food. 1923.
1237. Pineapple culture in Florida. E. D. Vosbury and J. R. Winston. 1921.
1238. Laws relating to fur-bearing animals. George A. Lawyer and Frank L. Earnshaw. 1921.

1239. Community bird refuges. W. L. McAtee. 1921.
1240. How to grow rice in the Sacramento Valley. Jenkin W. Jones. 1924.
1241. An improved method of making sugar-beet sirup. C. O. Townsend and Sidney F. Sherwood. 1921.
1242. Permanent fruit and vegetable gardens. W. R. Beattie and C. P. Close. 1921.
1243. The border method of irrigation. Samuel Fortier. 1922.
1244. Diseases, ailments, and abnormal conditions of swine. T. P. White. 1923.
1245. Farmers' telephone companies, organization, financing, and management. I. M. Spasoff and H. S. Beardsley. 1922.
1246. The peach borer: How to prevent or lessen its ravages; the paradichlorobenzene treatment. A. L. Quaintance. 1921.
1247. American moles as agricultural pests and as fur producers. Theo. H. Scheffer. 1922.
1248. The sugar-beet nematode in the Western States. Gerald Thorne and I. A. Giddings. 1922.
1249. Olive growing in the southwestern United States. C. F. Kinman. 1922.
1250. Green manuring. C. V. Piper and A. J. Pieters. 1922.
1251. Standard varieties of chickens. V. The bantam breeds and varieties. Rob R. Slocum. 1921.
1252. Sawflies injurious to rose foliage. William Middleton. 1922.
1253. Seed peas for the canner. D. N. Shoemaker. 1922.
1254. Important cultivated grasses. C. V. Piper. 1922.
1255. The production of peas for canning. Chester J. Hunn. 1922.
1256. Slash pine. Wilbur R. Mattoon. 1922.
1257. Insects injurious to the mango in Florida and how to combat them. G. F. Moznette. 1922.
1258. Webworms injurious to cereal and forage crops and their control. Geo. G. Ainslie. 1922.
1259. A sawfly injurious to young pines. William Middleton. 1922.
1260. Stored-grain pests. E. A. Back and R. T. Cotton. 1922.
1261. The avocado: Its insect enemies and how to combat them. G. F. Moznette. 1922.
1262. The boll-weevil problem. W. D. Hunter and B. R. Coad. 1922.
1263. Breeds of swine. E. Z. Russell. 1922.
1264. Farm manufacture of unfermented apple juice. Joseph S. Caldwell. 1922.
1265. Business methods of marketing hay. G. A. Collier. 1922.
1266. Preparation of peaches for market. H. W. Samson. 1922.
1267. Utilization of flue-heated tobacco barns for sweet-potato storage. Fred E. Miller. 1922.
1268. Sheep-killing dogs. M. W. Coll. 1922.
1269. Celery growing. W. R. Beattie. 1922.
1270. The more important apple insects. A. L. Quaintance and E. H. Siegler. 1922.
1271. Farm lands available for settlement. B. Henderson. 1922.
1272. Renting dairy farms. Howard A. Turner. 1922.
1273. The stock-poisoning death camas. C. Dwight Marsh and A. B. Clawson. 1922.
1274. Uses of rural community buildings. W. C. Nason. 1922.
1275. Weevils in beans and peas. E. A. Back. 1922.
1276. The velvet bean. C. V. Piper. 1922.
1277. Diseases of watermelons. W. A. Orton and F. C. Meier. 1922.
1278. Tractors on southern farms. H. R. Tolley and L. M. Church. 1922.
1279. Plain concrete for farm use. T. A. H. Miller. 1922.
1280. The hard red winter wheats. J. Allen Clark and John H. Martin. 1922.
1281. The hard red spring wheats. J. Allen Clark and John H. Martin. 1922.
1282. Nicotine dust for control of truck-crop insects. Roy E. Campbell. 1922.
1283. How to grow alfalfa. R. A. Oakley and H. L. Westover. 1922.
1284. Apple-orchard renovation. H. P. Gould. 1922.
1285. Lime-sulphur concentrate, preparation, uses, and designs for plants. E. H. Siegler and A. M. Daniels. 1922.
1286. The red-necked raspberry cane-borer. F. H. Chittenden. 1922.
1287. Foreign material in spring wheat. R. H. Black and C. R. Haller. 1922.
1288. Game laws for 1922. George A. Lawyer and Frank L. Earnshaw. 1922.
1289. Distribution of types of farming in the United States. W. J. Spillman. 1923.
1290. The bulk handling of grain. E. N. Bates and A. L. Rush. 1922.
1291. Preparation of fresh tomatoes for market. F. Earl Parsons. 1922.
1292. Organization and management of cooperative livestock shipping associations. 1923.
1293. Laws relating to fur animals, 1922. George A. Lawyer and Frank L. Earnshaw. 1922
1294 The European corn borer and its control. D. J. Caffrey and L. H. Worthley. 1922.
1295. What tractors and horses do on Corn Belt farms. L. A. Reynoldson and H. R. Tolley. 1923.
1296. Changes effected by tractors on Corn Belt farms. L. A. Reynoldson and H. R. Tolley. 1922.
1297. Cost of using tractors on Corn Belt farms. L. A. Reynoldson and H. R. Tolley. 1922.
1298. Cost of using horses on Corn Belt farms. M. R. Cooper and J. O. Williams. 1922.
1299. Shall I buy a tractor (for a Corn Belt farm). L. A. Reynoldson and H. R. Tolley. 1922.
1300. Choosing a tractor (for a Corn Belt farm). L. A. Reynoldson and H. R. Tolley. 1922.
1301. The common white wheats. J. Allen Clark, John H. Martin, and C. E. Leighty. 1922.
1302. How to get rid of rats. James Silver. 1923.
1303. The club wheats. J. Allen Clark and John H. Martin. 1923.
1304. The durum wheats. J. Allen Clark and John H. Martin. 1923.
1305. The soft, red winter wheats. Clyde E. Leighty and John H. Martin. 1922.
1306. The insect enemies of chrysanthemums. Charles A. Weigel. 1923.
1307. Quack grass. L. W. Kephart. 1923.
1308. Marketing the cowpea seed crop. J. E. Barr. 1923.

1309. Control of the common mealybug on citrus in California. Arthur D. Borden. 1923.
1310. The corn earworm: Its ravages on field corn, and suggestions for control. W. J. Phillips and Kenneth M. King. 1923.
1311. Chrysanthemums for the home. B. Morrison. 1923.
1312. Tree planting in the Great Plains region. F. R. Johnson and F. E. Cobb. 1923.
1313. Good proportions in the diet. Caroline L. Hunt. 1923.
1314. Motor trucks on Corn Belt farms. H. R. Tolley and L. M. Church. 1923.
1315. Cleaning milking machines. L. H. Burgwald. 1923.
1316. Marketing the early potato crop. George B. Fiske and Paul Froelich. 1923.
1317. Marketing main-crop potatoes. Wells A. Sherman, George B. Fiske, and O. D. Milliner. 1923.
1318. Greenhouse construction and heating. James H. Beattie. 1923.
1319. Cotton-dusting machinery. Elmer Johnson, S. T. Howard, and B. R. Coad. 1923.
1320. The production of cucumbers in greenhouses. J. H. Beattie. 1923.
1321. Fumigation of citrus trees for control of insect pests. R. S. Woglum. 1923.
1322. The striped cucumber beetle and how to control it. F. H. Chittenden. 1923.
1323. The wheat strawworm and its control. W. J. Phillips and F. W. Poos. 1923.
1324. Lamb and mutton and their use in the diet. 1923.
1325. Rural planning—the social aspects. W. C. Nason. 1923.
1326. Control of the codling moth in the Pacific Northwest. E. J. Newcomer, M. A. Yothers, and W. D. Whitcomb. 1924.
1327. Canaries: Their care and management. Alexander Wetmore. 1923.
1328. Production of seed flax. A. C. Dillman. 1924.
1329. The boll weevil problem. W. D. Hunter and B. R. Coad. 1923.
1330. Parasites and parasitic diseases of sheep. Maurice C. Hall. 1923.
1331. Back-yard poultry keeping. Rob. R. Slocum. 1923.
1332. Seed potatoes and how to produce them. William Stuart. 1923.
1333. Pruning citrus trees in the Southwest. A. D. Shamel, C. S. Pomeroy, and R. E. Caryl. 1923.
1334. Home tanning of leather and small fur skins. R. W. Frey, I. D. Clarke, and F. P. Veitch. 1923.
1335. Controlling the gipsy moth and the brown-tail moth. A. F. Burgess. 1923.
1336. Feeding and management of dairy calves and young dairy stock. W. K. Brainerd and H. F. Davis. 1923.
1337. Diseases of poultry. Bernard A. Gallagher. 1923.
1338. Tomatoes as a truck crop. W. R. Beattie. 1923.
1339. Red-clover culture, with notes on insect enemies of red clover. A. J. Pieters and W. R. Walton. 1923.
1340. Polish and poulard wheats. John H. Martin. 1923.
1341. Mule production. J. O. Williams. 1923.
1342. Dairy-barn construction. K. E. Parks. 1923.
1343. Culture of citrus fruits in the Gulf States. E. D. Vosbury and T. R. Robinson. 1923.
1344. The strawberry rootworm as an enemy of the greenhouse rose. C. A. Weigel and C. F. Doucette. 1923.
1345. Root-knot: Its cause and control. G. H. Godfrey. 1923.
1346. Carpet beetles and their control. E. A. Back. 1923.
1347. Standard varieties of chickens. I. The American class. Rob R. Slocum. 1923.
1348. The corrugation method of irrigation. James C. Marr. 1923.
1349. Increasing the potato crop by spraying. F. H. Chittenden and W. A. Orton. 1923.
1350. Beef-cattle barns. E. W. Sheets and M. A. R. Kelley. 1923.
1351. Cabbage diseases. L. L. Harter and L. R. Jones. 1923.
1352. The tobacco flea-beetle in the southern cigar-wrapper district. F. S. Chamberlin and J. N. Tenhet. 1923.
1353. Clothes moths and their control. E. A. Back. 1923.
1354. The yellow-fever mosquito. L. O. Howard. 1923.
1355. Blackleg: Its nature, cause, and prevention. John R. Mohler. 1923.
1356. Tobacco hornworm insecticide: Recommendations for use of powdered arsenate of lead in dark-tobacco district. A. C. Morgan. 1923.
1357. Castration of hogs. S. S. Buckley. 1923.
1358. Growing rye in the western half of the United States. John H. Martin and Ralph W. Smith. 1923.
1359. Milk and its uses in the home. 1923. Revised, 1924.
1360. Apple growing east of the Mississippi River. H. P. Gould. 1924.
1361. Brahman (Zebu) cattle. Virgil V. Parr. 1923.
1362. Insects injurious to ornamental greenhouse plants. C. A. Weigel and E. R. Sasscer. 1923.
1363. Natural and artificial incubation of hens' eggs. Alfred R. Lee. 1923.
1364. Important pecan insects and their control. John B. Gill. 1924.
1365. Clover failure. A. J. Pieters. 1924.
1366. Production of maple sirup and sugar. A. Hugh Bryan, William F. Hubbard, and S. F. Sherwood. 1923.
1367. Control of potato-tuber diseases. Michael Shapovalov and G. K. K. Link. 1924.
1368. Breaking and training colts. V. G. Stambaugh. 1923.
1369. Bridge grafting. Guy E. Yerkes. 1923.
1370. Dahlias for the home. B. Y. Morrison. 1923.
1371. Diseases and insects of garden vegetables. W. W. Gilbert and C. H. Popenoe. 1924.
1372. Plum and prune growing in the Pacific States. C. F. Kinman. 1924.
1373. Homing pigeons: Their care and training. Alfred R. Lee. 1924.
1374. Care of food in the home. 1923.
1375. Game laws for the season 1923–24. George A. Lawyer and Frank L. Earnshaw. 1923.
1376. Natural and artificial brooding of chickens. A. R. Lee. 1924.
1377. Marketing poultry. Rob R. Slocum. 1924.
1378. Marketing eggs. Rob R. Slocum. 1924.
1379. Beef production in the Cotton Belt. Arthur T. Semple. 1923.

1380. Apple scald and its control. Charles Brooks, J. S. Cooley, and D. F. Fisher. 1923.
1381. Herbaceous perennials. Furman Lloyd Mulford. 1924.
1382. Fattening steers in the Corn Belt. Wm. H. Black. 1924.
1383. Food values and body needs shown graphically. Emma A. Winslow. 1923.
1384. Community cotton production. O. F. Cook and R. D. Martin. 1924.
1385. Buying a farm in an undeveloped region. Bertha Henderson. 1924.
1386. Terracing farm lands. C. E. Ramser. 1924.
1387. Laws relating to fur animals for the season 1923–24. George A. Lawyer and Frank L. Earnshaw. 1923.
1388. Rural planning: The social aspects of recreation places. Wayne C. Nason. 1924.
1389. Sorgo-sirup manufacture. A. Hugh Bryan and Sidney F. Sherwood. 1924.
1390. Vegetable seeds for the home and market garden. W. W. Tracy and D. N. Shoemaker. 1924.
1391. The guinea fowl. Andrew S. Weiant. 1924.
1392. Black walnut for timber and nuts. W. R. Mattoon and C. A. Reed. 1924.
1393. Principles of dairy-barn ventilation. M. A. R. Kelley. 1924.
1394. Watermelons. W. R. Beattie. 1924.
1395. Beef-cattle production in the range area. Virgil V. Parr. 1925.
1396. The dasheen: A southern root crop for home use and market. Robert A. Young. 1924.
1397 Mouse control in field and orchard. James Silver. 1924.
1398. Currants and gooseberries: Their culture and relation to white-pine blister rust. George M. Darrow and S. B. Detwiler. 1924.
1399. Blackberry growing. George M. Darrow. 1924.
1400. Establishing cranberry fields. George M. Darrow, Henry J. Franklin, and O. G. Malde. 1924.
1401. Managing cranberry fields. George M. Darrow, Henry J. Franklin, and O. G. Malde. 1924.
1402. Cranberry harvesting and handling. Henry J. Franklin, George M. Darrow, and O. G. Malde. 1924.
1403. Dewberry growing. George M. Darrow. 1924.
1404. Pumping from wells for irrigation. Paul A. Ewing. 1924.
1405. The windbreak as a farm asset. Charles G. Bates. 1924.
1407. The Mexican bean beetle in the East. N. F. Howard. 1924.
1408. The housefly and how to suppress it. L. O. Howard and C. F. Bishopp. 1924.
1409. Turkey raising. Morley A. Jull and Alfred R. Lee. 1924.
1410. Control of brown-rot of prunes and cherries in the Pacific Northwest. D. F. Fisher and Charles Brooks. 1924.
1411. Crimson clover: Seed production. J. H. Westgate. 1924.
1412. Care and management of dairy bulls. J. R. Dawson. 1924.
1413. Poultry house construction. A. R. Lee. 1924.
1414. The rosette disease of wheat and its control. Aaron G. Johnson, Harold H. McKinney, Robert W. Webb, and Clyde E. Leighty. 1924.
1415. Beef on the farm—slaughtering, cutting, curing. W. H. Black and E. W. McComas. 1924.
1416. Fattening beef calves. Sam H. Ray. Revised by Arthur T. Semple. 1924. Supersedes Farmers' Bulletin 811.
1417. Idle land and costly timber. W. B. Greeley. 1924.
1418. Lettuce growing in greenhouses. James H. Beattie. 1924.
1419. Care and management of farm work horses. J. O. Williams and Earl B. Krantz. 1924.
1420. Handling rough rice to produce high grades. W. D. Smith. 1924.
1421. Successful farming on 80-acre farms in central Indiana. H. W. Hawthorne and Lynn Robertson. 1924.
1422. Udder diseases of dairy cows. Hubert Bunyea. 1924.
1423. Preparation of cabbage for market. Charles W. Hauck. 1924.
1424. Making vinegar in the home and on the farm. Edwin LeFevre. 1924.
1425. The tobacco flea-beetle in the dark fire-cured tobacco districts of Kentucky and Tennessee. A. C. Morgan and J. H. Gilmore. 1924.
1426. Farm plumbing. George M. Warren. 1924.
1427. Poultry accounts. A. R. Lee and Sheppard Haynes. 1924.
1428. Saving livestock from starvation on southwestern ranges. C. L. Forsling. 1924.
1429. Emmer and spelt. John H. Martin and Clyde E. Leighty. 1924.
1430. Power for the farm from small streams. A. M. Daniels, C. E. Seitz, and J. C. Glenn. 1925.
1431. Greenhouse tomatoes. James H. Beattie. 1924.
1432. Culture of pima and upland cotton in Arizona. O. F. Cook and R. D. Martin. 1924.
1433. Cultivated grasses of secondary importance. Charles V. Piper. 1925.
1434. Standard baskets for fruits and vegetables. F. P. Downing and H. A. Spilman. 1924.
1435. Diseases of stone fruits on the market. Dean H. Rose. 1924.
1436. Why potatoes run out. E. S. Schultz. 1924.
1437. Swine production. E. Z. Russell. 1925.
1438. Making fermented pickles. Edwin LeFevre. 1924.
1440. More profit for the wheat farmers of central Kansas. Jesse W. Tapp and W. E. Grimes. 1924.
1441. Rural planning—the village. Wayne C. Nason. 1925.
1442. Storage of sweet potatoes. H. C. Thompson. 1925.
1443. Dairy cattle breeds. Ame B. Nystrom. 1925.
1444. Game laws for the season 1924–25. George A. Lawyer and Frank L. Earnshaw. 1924.
1445. Laws relating to fur animals for the season 1924–25. Frank G. Ashbrook and Frank L. Earnshaw. 1924.
1446. Cow-testing associations and stories the records tell. J. C. McDowell. 1925.
1447. Citrus fruit growing in the Southwest. A. D. Samuel and R. E. Caryl. 1925.
1448. Farmstead water supply. George M. Warren. 1925.
1450. Home baking. Charlotte Chatfield. 1925.

1451. Making and using cottage cheese in the home. Kenneth J. Matheson and Jessie M. Hoover. 1925.
1452. Painting on the farm. H. P. Holman. 1925.
1453. Growing and planting coniferous trees on the farm. C. R. Tillotson. 1925.
1454. Home utilization of muscadine grapes. Charles Dearing. 1925.
1455. Fitting, showing, and judging hogs. E. Z. Russell. 1925.
1456. Homes for birds. E. R. Kalmbach and W. L. McAtee. 1925.
1457. Packing apples in boxes. Raymond R. Pailthorp and Frank S. Kinsey. 1925.
1458. Strawberry diseases. Neil E. Stevens. 1925.
1459. Selling black walnut timber. Warren D. Brush. 1925.
1460. Simple plumbing repairs in the home. G. M. Warren. 1925.
1463. Successful farming on 160-acre farms in central Indiana. Lynn Robertson and H. W. Hawthorne. 1925.
1464. Barley: Culture, uses, and varieties. Harry V. Harlan. 1925.
1465. Cotton ginning. G. S. Meloy. 1925.
1466. Game laws for the season 1925–26. George A. Lawyer and Frank L. Earnshaw. 1925.
1469. Laws relating to fur animals for the season 1925–26. Frank G. Ashbrook and Frank L. Earnshaw. 1925.

NOTE.—Numbers omitted have not been published. (December 31, 1925.)

STATISTICAL BULLETINS (1923–1925)

1. Cold storage holdings, year ending January, 1923, with comparable data for earlier years. 1923.
2. Seed statistics, year ended May 31, 1923, with comparable data for earlier years. 1924.
3. Sheep, lamb, mutton, and wool statistics, year ended March 31, 1923, with comparable data for earlier years. 1924.
4. Cold-storage holdings to October, 1924. 1925. Revision of Statistical Bulletin 1.
5. Horses, mules, and motor vehicles, year ended March 31, 1924, with comparable data for earlier years. 1925.
6. Grain futures: Daily data. Volume of trading on the Chicago Board of Trade, January 1, 1921, to May 31, 1924. 1924.
7. Shipments and unloads of certain fruits and vegetables, 1918–1923. 1925.
8. Carload shipments of fruits and melons from stations in United States for 1920, 1921, 1922, and 1923. 1925.
9. Carload shipments of vegetables from stations in the United States for 1920, 1921, 1922, and 1923. 1925.
10. Statistics of potatoes and sweet potatoes, year ended July 31, 1924, with comparable data for earlier years. 1925.
11. Hay and feed statistics, year ended December 31, 1924, with comparable data for earlier years. 1925.

DEPARTMENT CIRCULARS

1. Suggestions for the marketing of cottage cheese. Delos L. James. 1919.
2. Sewing for girls' club work. Ola Powell. 1919.
3. Drying vegetables and fruits for home use. Frants P. Lund. 1919.
4. Vacation land: The national forests in Oregon. 1919.
5. Out-of-door playgrounds of the San Isabel National Forest. 1919.
6. A summer vacation in the Sopris National Forest. 1919.
7. Trend of the dairy-cattle industry in the United States and other countries. T. R. Pirtle. 1919.
8. Arbor Day. L. C. Everard. 1919.
9. Meadow fescue. H. N. Vinall. 1919.
13. Brood coops and appliances. Boys' and girls' poultry club work. 1919.
14. Care of baby chicks. Boys' and girls' poultry club work. 1919.
15. Preserving eggs. Boys' and girls' poultry club work. 1919.
16. Lice, mites, and cleanliness. Boys' and girls' poultry club work. 1919.
17. Management of growing chicks. Boys' and girls' poultry club work. 1919.
18. Culling for eggs and market. Boys' and girls' poultry club work. 1919.
19. Poultry houses. Boys' and girls' poultry club work. 1919.
20. Common poultry diseases. Boys' and girls' club work. 1919.
25. Points for egg buyers: What to sell, what to buy, how to candle. 1919.
26. Delicious products of the dairy. J. C. McDowell. 1919.
27. Gardening instructions for club members. 1919.
28. Cotton gin fires caused by static electricity. 1919.
29. Vacation trips in the Holy Cross National Forest. 1919.
30. Organization of a county for extension work: The farm-bureau plan. L. R. Simons. 1919.
31. Culling the poultry flock: Why, when, and how. 1919.
32. Potato wart: A dangerous new disease. 1919.
33. How teachers may use Farmers' Bulletin 1044, the city home garden. Alvin Dille. 1919.
34. Outdoor life in the Colorado National Forest. 1919.
35. Boys' and girls' club work: Diseases and insects of the home garden. W. W. Gilbert. 1919.
36. Use of poultry club products. 1919.
37. Status and results of county-agent work, Northern and Western States, 1918, showing war service of the county agent. W. A. Lloyd. 1919.
38. Boys' agricultural club work in the Southern States. I. W. Hill and G. W. Chambers. 1919.
39. A report on the retail prices of nitrate of soda and acid phosphate as of May 1, 1919. 1919.
40. Insect enemies and diseases of the tomato. 1919.

41. Mountain playgrounds of the Pike National Forest. 1919.
42. Perennial ryegrass (*Lolium perenne*). Lyman Carrier. 1919.
43. Redtop. (*Agrostis alba*). Lyman Carrier. 1919.
44. Italian ryegrass (*Lolium multiflorum*). Lyman Carrier. 1919.
45. Para grass. (*Panicum barbinode*). S. M. Tracy. 1919.
46. How to make a hog crate. 1919.
47. Stomach worms in sheep: Prevention and treatment. 1919.
48. Boys' and girls' club work: The club member's home vegetable garden. 1919.
49. Making and maintaining a lawn. 1919.
50. Sudan grass (*Andropogon sorghum* var.). 1919.
51. Our national elk herds: A program for conserving the elk on national forests about the Yellowstone National Park. Henry P. Graves and E. W. Nelson. 1919.
52. How to wrap heads: Points for poultry packers, No. 4. 1919.
53. Milk and cream contests. Ernest Kelly and George B. Taylor. 1919.
54. Tuberculosis eradication under the accredited-herd plan. Herd List No. 2. 1919.
55. How to load cars of eggs. Points for egg shippers, No. 1. 1919.
56. Suggested improvements in methods of selling cotton by farmers. O. J. McConnell. 1919.
57. A report on the retail prices of unmixed fertilizer material as of June 1, 1919, with comparative prices for May 1. 1919.
58. Fruit growing on the northern Great Plains. Max Pfander. 1919.
59. Suggestions for field studies of mammalian life-histories. 1919.
60. The work of the Belle Fourche (S. Dak.) reclamation project experiment farm in 1918. Beyer Anne. 1919.
61. Sources of American potash. R. O. E. Davis. 1919.
62. Horticultural exhibitions and garden competitions. F. L. Mulford. 1919.
63. Directory of officials and organizations concerned with the protection of birds and game, 1919. 1919.
64. How lumber is graded. H. S. Betts. 1920.
65. Distribution of tulip and narcissus bulbs in 1919. R. A. Oakley. 1919.
66. Organization and results of boys' and girls' club work (Northern and Western States), 1918. O. H. Benson and Gertrude Warren. 1920.
67. How teachers may use Farmers' Bulletin 602, clean milk: Production and handling. Alvin Dille. 1920.
68. How teachers may use publications on the control of diseases and insect enemies of the home garden. Alvin Dille. 1919.
69. How teachers may use Farmers' Bulletin 876, making butter on the farm. E. H. Shinn. 1919.
70. Trend of the butter industry in the United States and other countries. T. R. Pirtle. 1919.
71. Trend of the cheese industry in the United States and other countries. T. R. Pirtle. 1919.
72. Good drinks made of milk, kickless, but full of punch. 1919.
73. The work of the San Antonio (Texas) Experiment Farm in 1918. C. R. Letteer. 1920.
74. How to break eggs for freezing: Points for egg breakers. 1920.
75. The work of the Yuma reclamation project experiment farm in 1918. R. E. Blair. 1920.
76. Directions for collecting flowering plants and ferns. S. F. Blake. 1920.
77. Suggestions for a state law providing for the organization of farmers' mutual fire insurance companies. V. N. Valgren. 1920.
78. A machine for trimming camphor trees. G. A. Russell. 1920.
79. Tropical fowl mite in the United States. H. P. Wood. 1920.
80. The work in 1918 of the Newlands (formerly the Truckee-Carson) reclamation project experiment farm. F. B. Headley. 1920.
81. *Astragalus tetrapterus*, a new poisonous plant of Utah and Nevada. C. Dwight Marsh and A. B. Clawson. 1920.
82. A new sheep-poisoning plant of the Southern States. C. Dwight Marsh. 1920
83. Testing farms in the South for efficiency in management. C. L. Goodrich. 1920.
84. Crop injury by borax in fertilizers. Oswald Schreiner, B. E. Brown, and J. J. Skinner. 1920.
85. Safe farming in the Southern States in 1920. Bradford Knapp. 1920.
86. The work of the Huntley (Mont.) reclamation project experiment farm in 1918. Dan Hansen. 1920.
87. Sweet-clover-seed screenings not injurious to sheep. C. Dwight Marsh and Glenwood C. Roe. 1920.
88. Annual report of the governor of Alaska on the Alaska game law, 1919. Thomas Riggs, jr. 1919.
89. Kudzu. C. V. Piper. 1920.
90. Control of watermelon anthracnose by spraying. F. C. Meier. 1920.
91. The land of beautiful water. Chelan National Forest. 1920.
92. The jack bean. C. V. Piper. 1920.
93. The development of the Peruvian alfalfa industry in the United States. H. L. Westover. 1920.
94. TNT as a blasting explosive. Charles E. Munroe and Spencer P. Howell. 1920.
95. United States grades for northern-grown onions. Hartley E. Traux. 1920.
96. United States grades for potatoes. Hartley E. Traux. 1920.
97. United States grades for Bermuda onions. Hartley E. Traux. 1920.
98. The installation of dust-collecting fans on thrashing machines for the prevention of explosions and fires, and for grain cleaning. H. E. Roethe, jr., and E. N. Bates. 1920.
99. United States grades for sweet potatoes. Hartley E. Traux. 1920.
100. Vacation on the White Mountain National Forest. 1921.
101. The whorled milkweed, a plant poisonous to livestock. C. Dwight Marsh. 1920.
102. The migratory bird treaty. 1920.
103. Mountain outings on the Rainier National Forest. 1920.

104. Fishing, hunting, and camping on the Cascade National Forest. 1920.
105. Forest trails and highways of the Mount Hood region. 1920.
106 Status and results, county agent work, Northern and Western States, 1919. W. A. Lloyd. 1920.
107. A system of field and office records for county extension workers. M. C. Wilson. 1920.
108. Chicory: Control and eradication. Albert A. Hansen. 1920.
109. Cocklebur. Albert A. Hansen. 1920.
110. The work of the Umatilla reclamation project experiment farm in 1918 and 1919. H. K. Dean. 1920.
111. Potato wart. G. R. Lyman, L. O. Kunkel, and C. R. Orton. 1920.
112. Timber depletion and the answer. 1920.
113. Alfalfa: Instructions adapted to Michigan, Wisconsin, and Minnesota. 1920.
114. Motion pictures of the United States Department of Agriculture. A list of films and their uses. Fred W. Perkins and George R. Georgens. 1920.
115. Alfalfa: Instructions adapted to southern New Jersey, Delaware, southern Maryland, Virginia, Arkansas, Tennessee, and the South Atlantic and Gulf States. 1920.
116. Alfalfa: Instructions adapted to Ohio, Indiana, Illinois, Iowa, Missouri, and Kentucky. 1920.
117. Peruvian alfalfa. 1920.
118. Field pea. 1920.
119. Cowpeas. 1920.
120. Soy bean. 1920.
121. Velvet beans. 1920.
122. Dry-land alfalfa. 1920.
123. Grimm alfalfa. 1920.
124. Spur feterita. 1920.
125. Forcing and blanching dasheen shoots. Robert A. Young. 1920.
126. Alfalfa: Instructions adapted to New England States and New York. 1920.
127. Alfalfa: Instructions adapted to Pennsylvania, West Virginia, northwestern Maryland, and northern New Jersey. 1920.
128. The manufacture and use of peanut butter. H. C. Thompson. 1920.
129. Milk for the family. 1920. Rev. 1921.
130. The hawkweeds or paintbrushes. Albert A. Hansen. 1920.
131. Directory of officials and organizations concerned with the protection of birds and game, 1920. 1920.
132. A mountain vacation land: The Washington National Forest. 1920.
133. United States grades for milled rice. 1920.
134. Livestock grazing as a factor in fire protection on the national forests. John H. Hatton. 1920.
135. Maintenance of the fur supply. Ned Dearborn. 1920.
136. The work of the Newlands reclamation project experiment farm in 1919. F. B. Headley. 1920.
137. The Bureau of Chemistry of the United States Department of Agriculture. 1920.
138. In the open: The national forests of Washington. 1920.
139. The Government exhibit at the 1920 national dairy show. 1920.
140. Statistics of cooperative extension work 1920–21. 1920.
141. Status and results of home demonstration work, Northern and Western States, 1919. Florence E. Ward. 1921.
142. Tuberculosis eradication under the accredited-herd plan. (Herd List No. 3.) 1920.
143. Tuberculosis eradication under the accredited herd plan. (Supplement 1 to Herd List No. 3.) 1920.
144. Tuberculosis eradication under the accredited herd plan. (Supplement 2 to Herd List No. 3.) 1920.
145. Australia and New Zealand as markets for American fruit. Samuel B. Moomaw and Caroline B. Sherman. 1921.
146. Markets for American fruits in China. Clarence B. Moomaw and Marjorie L. Franklin. 1920.
147. The work of the Huntley reclamation project experiment farm in 1919. Dan Hansen. 1921.
148. The farm woman's problems. Florence E. Ward. 1920.
149. Cooperative cane-sirup canning: Producing sirup of uniform quality. J. K. Dale. 1920.
150. Statistical data compiled and published by the Bureau of Crop Estimates 1863–1920. 1921.
151. Distribution of cottonseed in 1921. Introductory statement by O. F. Cook. 1920.
152. Organization and results of boys' and girls' club work, Northern and Western States, 1919. George E. Farrell and Ivan L. Hobson. 1921.
153. Developing an American utility horse. J. O. Williams. 1921.
154. Nicotine sulphate in a dust carrier against truck-crop insects. Roy E. Campbell. 1921.
155. How teachers may use Farmers' Bulletin 1087, beautifying the farmstead. C. H. Schopmeyer. 1921.
156. How teachers may use Farmers' Bulletin 1175, better seed corn. F. A. Merrill. 1921.
157. How teachers may use Farmers' Bulletin 1148, cowpeas: Culture and varieties. F. A. Merrill. 1921.
158. How teachers may use Farmers' Bulletin 1125, forage for the Cotton Belt. F. A. Merrill. 1921.
159. How teachers may use Farmers' Bulletin 1121, factors that make for success in farming in the South. F. A. Merrill. 1921.
160. Peppers. 1921.
161. Pisgah National Game Preserve: Regulations and information for the public. 1921.
162. Some rules for poisoning the cotton-boll weevil. B. R. Coad and T. P. Cassidy. 1922.
163. Dispersion of the boll weevil in 1920. B. R. Coad and R. W. Moreland. 1921.

164. Cotton culture in the San Joaquin Valley in California. Wofford B. Camp. 1921.
165. Lawn pennywort: A new weed. Albert A. Hansen. 1921.
166. Influence of winter rations on the growth of steers on pasture. E. W. Sheets. 1921.
167. The satin moth: An introduced enemy of poplars and willows. A. F. Burgess. 1921.
168. Annual report of the Governor of Alaska on the Alaska game law, 1920. Thomas Riggs, jr. 1921.
169. Annual white sweet clover and strains of the biennial form. A. J. Pieters and L. W. Kephart. 1921.
170. Instructions for bird banding. Frederick C. Lincoln. 1921.
171. Unprotected electric lights. A recently developed dust explosion and fire hazard. David J. Price and Hylton R. Brown. 1921.
172. The range crane-flies in California. C. M. Packard and B. G. Thompson. 1921.
173. The work of the Scottsbluff reclamation project experiment farm in 1918 and 1919. James A. Holden. 1921.
174. A dangerous tobacco disease appears in the United States. Erwin F. Smith and R. E. B. McKenney. 1921.
175. Linters. A. M. Agelasto. 1921.
176. Suggestions to growers for treatment of tobacco blue-mold disease in the Georgia-Florida district. Erwin F. Smith and R. E. B. McKenney. 1921.
177. Treatment of ornamental white pines infected with blister rust. J. F. Martin, G. F. Gravatt and G. B. Posey. 1921.
178. Status and results of home demonstration work, Northern and Western States, 1920. Florence E. Ward. 1921.
179. Status and results of county agent work, Northern and Western States, 1920. W. A. Lloyd. 1921.
180. The "alkali disease" of livestock in the Pecos Valley. C. Dwight Marsh and Glenwood C. Roe. 1921.
181. The present status of the tobacco blue-mold (Peronospora) disease in the Georgia-Florida district. Erwin F. Smith and R. E. B. McKenney. 1921.
182. The migratory bird treaty act. 1921.
183. Seedtime and harvest. Oliver E. Baker, Charles F. Brooks, James R. Covert and Reginald G. Halnesworth. 1922.
184. State laws and court decisions relating to cattle-tick eradication. Harry Goding. 1921.
185. Handbook for campers in the national forests in California. 1921.
186. The occurrence of wheat downy mildew in the United States. William H. Weston, jr. 1921.
187. List of serials currently received in the library of the United States Department of Agriculture. 1922.
188. Progress of barberry eradication. F. E. Kempton. 1921.
189. The well-planned kitchen. Ruth Van Deman. 1921. Rev. 1923.
190. Extension work among negroes, 1920. W. B. Mercier. 1921.
191. Use of explosives in blasting stumps. George R. Boyd. 1921.
192. Status and results of boys' and girls' club work, Northern and Western States, 1920. George E. Farrell. 1921.
193. Fulghum oats. T. R. Stanton. 1921.
194. Kanred wheat. J. Allen Clark and S. C. Salmon. 1921.
195. A list of fungi (Ustilaginales and Uredinales) prepared for exchange. Flora W. Patterson, William W. Diehl and Edith K. Cash. 1922.
196. Directory of officials and organizations concerned with the protection of birds and game, 1921. Geo. A. Lawyer and Frank L. Earnshaw. 1921.
197. The credit association as an agency for rural short-time credit. V. N. Valgren and Elmer E. Engelbert. 1921.
198. Government forest work in Utah. 1921.
199. Breeding Morgan horses at the United States Morgan Horse Farm. H. H. Reese. 1921.
200. Improvements in cotton production. O. F. Cook. 1921.
201. Eradication of the sweet-potato weevil in Florida. J. E. Graf and B. L. Boyden. 1921.
202. The migratory bird treaty act. United States vs. Joseph Lumpkin. 1922.
203. Statistics of cooperative extension work, 1921–22. Eugene Merritt. 1922.
204. The work of the Huntley reclamation project experiment farm in 1920. Dan Hansen. 1921.
205. Cottonseed mixing increased by modern gin equipment. W. W. Ballard and C. B. Doyle. 1922.
206. A new feature of bud variation in citrus. Tyozaburo Tanaka. 1922.
207. The paper dress form. 1922.
208. Trebi barley, a superior variety for irrigated land. Harry V. Harlan, Merritt N. Pope and Louis C. Aicher. 1922.
209. The work of the San Antonio experiment farm in 1919 and 1920. George T. Ratliffe. 1922.
210. Dispersion of the boll weevil in 1921. B. R. Coad, E. S. Tucker, W. B. Williams, F. F. Bondy, and R. C. Gaines. 1922.
211. Government forest work. 1922.
212. The manufacture and sale of farm equipment in 1920. H. R. Tolley and L. M. Church. 1922.
213. Eradication of lice on pigeons. H. P. Wood. 1922.
214. Fusarium tuber rot of potatoes. George K. K. Link and F. C. Meier. 1922.
215. Commercial control of citrus scab. John R. Winston. 1922.
216. Controlling the curculio, brown rot, and scab in the peach belt of Georgia. Oliver I. Snapp, William F. Turner, and John W. Roberts. 1922.
217. Anthracnose of muskmelons. George K. K. Link and F. C. Meier. 1922.
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224. Nicotine dust for control of the striped cucumber beetle. W. H. White. 1922.
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226. White pine blister rust in the western United States. 1922.
227. Eastern blue-stem of the black raspberry. R. B. Wilcox. 1922.
228. The livestock industry in South America. L. B. Burk and E. Z. Russell. 1922.
229. Wild rice. Charles E. Chambliss. 1922.
230. Home tanning. R. W. Frey, I. D. Clarke, and F. P. Veitch. 1922.
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236. Defects in the quality of butter. C. W. Fryhofer. 1922.
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238. United States grades for potatoes. Harold W. Samson. 1922.
239. State forestry laws of 1921. Jeannie S. Peyton. 1922.
240. The national forests of New Mexico. 1922.
241. Food animals and meat consumption in the United States. John Roberts. 1922.
242. Directory of officials and organizations concerned with the protection of birds and game, 1922. George A. Lawyer and Frank L. Earnshaw. 1922.
243. Forest fires in California, 1911–1920. S. B. Show and E. I. Kotok. 1923.
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249. Tuberculin testing of livestock. L. B. Ernest and Elmer Lash. 1922.
250. Educational milk-for-health campaigns. Jessie M. Hoover. 1923.
251. Federal legislation, regulations, and rulings affecting land-grant colleges and experiment stations. 1923.
252. Preparation of peat composts. Alfred P. Dachnowski. 1922.
253. Statistics of cooperative extension work, 1922–1923. Eugene Merritt. 1923.
254. Homemade apple and citrus pectin extracts and their use in jelly making. Minna C. Denton, Ruth Johnstin, and Fanny Walker Yeatman. 1923.
255. Status and results of boys' and girls' club work, Northern and Western States, 1921. George E. Farrell and Gertrude L. Warren. 1923.
256. History and seed production of purple vetch. Roland McKee. 1923.
257. Composition of filter press (lime) cake. Sidney F. Sherwood. 1923.
258. Turpentine and rosin: Distribution of the world's production, trade, and consumption. V. E. Grotlisch. 1923.
259. Commercial control of citrus melanose. John R. Winston and John J. Bowman. 1923.
260. Annual report of the Governor of Alaska on the Alaska game law, 1922. Scott C. Bone. 1923.
261. The purpose of bird censuses and how to take them. May Thacher Cooke. 1923.
262. Length of the dormancy period of the sugar-beet nematode in Utah. Gerald Thorne. 1923.
263. Preliminary report on control of San José scale with lubricating-oil emulsion. A. J. Ackerman. 1923.
264. Frost resistance in flax. Robert L. Davis. 1923.
265. Arbor Day. 1923.
266. Dispersion of the boll weevil in 1922. F. F. Bondy, R. C. Gaines, W. B. Williams, and M. T. Young. 1923.
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268. Kill the common barberry with chemicals. Noel F. Thompson. 1923.
269. Barberry eradication prevents black rust in western Europe. E. C. Stakman. 1923.
270. Extension work in agricultural engineering, 1922. George R. Boyd. 1924.
271. Grounding cotton gins to prevent fires. Harry E. Roethe. 1923.
272. Wooly-pod milkweed, a dangerous stock-poisoning plant. C. D. Marsh and A. B. Clawson. 1923.
273. Flag smut of wheat. W. H. Tisdale, G. H. Dungan, and C. E. Leighty. 1923.
274. Dusting for the cotton boll weevil. B. R. Coad and T. P. Cassidy. 1923.
275. The work of the Huntley reclamation project experiment farm in 1921. Dan Hansen. 1923.
276. Inspection of milk supplies. Ernest Kelly and C. S. Leete. 1923.
277. Crop tests at the cooperative testing station, Sacaton, Ariz. C. J. King. 1923.
278. The commercial classification of American cotton, with reference to the standards for grade, color, and staple. Arthur W. Palmer. 1924.
279. Greasewood as a poisonous plant. C. Dwight Marsh, A. B. Clawson, and James F. Couch. 1923.
280. Kota wheat. J. Allen Clark and L. R. Waldron. 1923.
281. Potato brown-rot. F. C. Meier and G. K. K. Link. 1923.
282. The Australian tomato weevil introduced in the South. F. H. Chittenden. 1923.
283. Livestock poisoning by cocklebur. C. Dwight Marsh, G. C. Roe, and A. B. Clawson. 1923.
285. Status and results of home demonstration work, Northern and Western States, 1921. Florence E. Ward. 1923.

286. The chayote: Its culture and uses. L. G. Hoover. 1923.
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293. Commercial control of citrus stem-end rot. John R. Winston, Harry R. Fulton, and John J. Bowman. 1923.
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297. The eelworm disease; a menace to alfalfa in America. G. H. Godfrey. 1923.
298. Directory of officials and organizations concerned with the protection of birds and game. 1923. George A. Lawyer and Frank L. Earnshaw. 1923.
299. Quarantine procedure to safeguard the introduction of citrus plants: A system of aseptic plant propagation. Walter T. Swingle, T. Ralph Robinson, and Eugene May, jr. 1924.
300. Commercial cuts of meat. W. C. Davis. 1924.
301. Introduction of parasites of the alfalfa weevil into the United States. Thomas R. Chamberlin. 1924.
302. Farm management extension. Early development and status in 1922. H. M. Dixon. 1924.
303. Hot-water treatment of sugar cane for insect pests—a precaution. P. A. Yoder and J. W. Ingram. 1923.
304. United States grades for shelled white Spanish peanuts. 1924.
305. Electrochemical treatment of seed wheat. C. E. Leighty and J. W. Taylor. 1924.
306. Statistics of cooperative extension work, 1923–24. Eugene Merritt. 1924.
307. A method of testing farm-management and cost-of-production data for validity of conclusions. H. R. Tolley and S. W. Mendum. 1924.
308. An extension program in range livestock, dairying, and human nutrition for the Western States. W. A. Lloyd. 1924.
309. Spraying strawberries for the control of fruit rots. E. M. Stoddard, D. H. Rose, and N. E. Stevens. 1924.
310. The solar propagating frame for rooting citrus and other subtropical plants. Walter T. Swingle, T. Ralph Robinson, and E. May, jr. 1924.
311. Cabbage-seed treatment. J. C. Walker. 1924.
312. Boys' and girls' club work, 1922. Ivan L. Hobson and Gertrude L. Warren. 1924.
313. Purchase of land for national forests under act of March 1, 1911, the Weeks' law. 1924.
314. Home demonstration work, 1922. Grace E. Frysinger. 1924.
315. Chilling of tomatoes. H. C. Diehl. 1924.
316. Methods and results of cooperative extension work, reported through county agricultural agents, 1922. H. W. Hochbaum. 1924.
317. Korean lespedeza, a new forage crop. A. J. Pieters and G. P. Van Eseltine. 1924.
318. The national forests of Arizona. 1924.
319. Composition of sugar-beet pulp and tops and of silage therefrom. Sidney F. Sherwood. 1924.
320. The Van Fleet raspberry, a new hybrid variety. George M. Darrow. 1924.
321. Control of cucumber mosaic in the greenhouse. S. P. Doolittle. 1924.
322. Mycotic stomatitis of cattle. John R. Mohler. 1924.
323. How to collect, label, and pack living plant material for long-distance shipment. B. T. Galloway. 1924.
324. Markton, an oat variety immune from covered smut. T. R. Stanton, D. E. Stephens, and E. F. Gaines. 1924.
325. Foot-and-mouth disease, with special reference to the outbreak of 1914. John R. Mohler. 1924.
326. United States grades for timothy hay, clover hay, clover mixed hay, and grass mixed hay, effective Feb. 1, 1924. Edward C. Parker. 1924.
327. The French turpentining system applied to longleaf pine. E. R. McKee. 1924.
328. Directory of officials and organizations concerned with the protection of birds and game: 1924. George A. Lawyer and Talbott Denmead. 1924.
329. Extension work in plant pathology, 1923. Fred C. Meier. 1924.
330. Work of the Huntley reclamation project experiment farm in 1922. Dan Hansen. 1924.
331. Standard specifications for corrugated metal pipe culverts. 1925.
332. Chemical eradication of the common barberry. Noel F. Thompson. 1924.
333. Handling the soft-corn crop. Frederick D. Richey. 1924.
334. The bee-louse, *Braula coeca*, in the United States. E. F. Phillips. 1925.
335. An extension program in crop production to reenforce range livestock, dairying, and human nutrition for the Western States. W. A. Lloyd. 1924.
336. Spread of the European starling in North America. May Thacher Cooke. 1925.
337. Hot-water treatment of dormant and sprouted seed cane. P. A. Yoder. 1925.
338. Parasites and parasitic diseases of dogs. Maurice C. Hall. 1925.
339. Work of the Belle Fourche reclamation experiment farm from 1919 to 1922, inclusive. Beyer Anne. 1925.
340. Cost of producing field crops, 1923. M. R. Cooper and C. R. Hawley. 1925.
341. Seed flax as a farm crop in 1925. A. C. Dillman, A. C. Arny, Clyde McKee, T. E. Stone, and A. N. Hume. 1925.
342. Work of the Umatilla reclamation project experiment farm in 1920, 1921, and 1922. H. K. Dean. 1925.

343. Extension work in agronomy, 1923. O. S. Fisher. 1925.
344. Extension work in agricultural engineering, 1923. Guy Ervin. 1925.
345. Farm forestry extension, early development, and status in 1923. G. H. Collingwood. 1925.
346. Extension work with fruits, vegetables, and ornamentals, 1923. C. P. Close, W. R. Beattie, and F. L. Mulford. 1925.
347. Methods and results of cooperative extension work, 1923. H. W. Gilbertson and C. L. Chambers. 1925.
348. Boys' and girls' 4-H club work, 1923. I. W. Hill and Gertrude L. Warren. 1925.
349. Extension work in foods and nutrition, 1923. Miriam Birdseye. 1925.
350. An improved type of pressure tester for the determination of fruit maturity. J. R. Magness and George F. Taylor. 1925.
351. Centralized management of a large corporate estate operated by tenants in the wheat belt. Walter H. Baumgartel. 1925.
352. Work of the Newlands reclamation project experiment farm in 1922 and 1923. F. B. Headley, E. W. Knight, and L. E. Cline. 1925.
353. Improved oat varieties for New York and adjacent States. H. H. Love, T. R. Stanton, and W. T. Craig. 1925.
354. Weather conditions and forest fires in California. S. B. Show and E. I. Kotok. 1925.
355. Extension work among negroes, 1923. J. A. Evans. 1925.
356. The common barberry and how to kill it. F. E. Kempton and Noel F. Thompson. 1925.
357. Production of acala cotton in the San Joaquin Valley of California. Wofford B. Camp. 1925.
358. Fire and the forest. (California pine region.) S. B. Show and E. I. Kotok. 1925.
360. Directory of officials and organizations concerned with the protection of birds and game: 1925. Talbott Denmead and Frank L. Earnshaw. 1925.
364. The color grading of honey. E. L. Secrist. 1925.
375. An extension program in home management and farm management for the Western States, with reports of standing regional committees on range livestock, dairying, farm crops, and human nutrition. W. A. Lloyd. 1925.

NOTE.—Numbers omitted have not been published. (December 31, 1925.)

MISCELLANEOUS CIRCULARS

3. Relation of agricultural education to farm organizations. C. W. Pugsley. 1923.
4. List of workers in subjects pertaining to agriculture, 1922–1923: Part II. State agricultural colleges and experiment stations. 1923.
5. In the land of the ancient cliff dweller. Bandelier National Monument. 1923.
6. Crop and livestock estimates, 1910–1922. 1923.
7. A forest fire prevention handbook for the school children of California. State Forester and Superintendent of Public Instruction, California. 1923.
8. Demonstration courses in kiln drying, boxing and crating, gluing of wood, wood properties and uses. 1923.
9. Importation and inspection of tea. 1923.
10. Grain futures act, 1922: General rules and regulations of the Secretary of Agriculture with respect to contract markets. 1923.
11. Agricultural cooperation: A selected and annotated list with special reference to purchasing, marketing, and credit. Chastina Gardner. 1923.
12. A handbook for better feeding of livestock. E. W. Sheets and William Jackson. 1923. Revised, 1925.
13. Local names of migratory game birds. W. L. McAtee. 1923.
14. State sanitary requirements governing admission of livestock. 1924.
15. Importance of forestry and the national forests. 1924.
16. Tree distribution under the Kinkaid Act of 1911. 1925.
17. List of workers in subjects pertaining to agriculture, 1923–1924: Part II. State agricultural colleges and experiment stations. 1924.
18. Instructions for banding birds. Frederick C. Lincoln. 1924.
19. Forest fires in intermountain region. 1924.
20. Crop report regulations: Effective on and after January 1, 1924. 1923.
21. Posters prepared by school children in milk-for-health programs. Jessie M. Hoover. 1924.
22. The naval stores act and regulations for its enforcement: Effective March 1, 1924. 1924.
23. The agricultural outlook for 1924. 1924.
24. Time-tables for home canning of fruits and vegetables. 1924.
25. Directions for examining all canned food before use. 1924.
26. The cow tester's handbook. J. C. McDowell. 1924.
27. Motion pictures of the Department of Agriculture: A list of films, and how to obtain them 1924. Supplement, 1925. Title: New motion pictures released by the United States Department of Agriculture.
28. Tables for converting crude protein and ash content to a uniform moisture base. J. H. Shollenberger and D. A. Coleman. 1924.
29. Demonstration courses in wood utilization. 1924.
30. Directory of field activities of the Bureau of Plant Industry. 1924.
31. Let's know some trees. Charles H. Shinn. 1925.
32. Practical farm economics. Henry C. Taylor, H. R. Tolley, and J. W. Tapp. 1924.
33. Some tested methods for livestock improvement. D. S. Burch. 1925.
34. List of workers in subjects pertaining to agriculture in State agricultural colleges and experiment stations, 1924–25. Mary A. Agnew. 1925.
35. Bibliography on the marketing of agricultural products. Emily L. Day, Katherine Jacobs, Margaret T. Olcott, and Mary G. Lacy. 1925.
36. The Wichita National Forest and Game Preserve. S. M. Shanklin and James E. Scott. 1925.
37. Crop report regulations: Effective January 1, 1925. 1925.
38. The Agricultural Outlook for 1925. 1925.

39. Report of the National Conference on Utilization of Forest Products, Washington, D. C., November 19 and 20, 1924. 1925.
40. White pine is profitable if protected from blister rust. J. F. Martin. 1925.
41. Estimating the quantity of grain in bins, with chart reducing the necessary computations. E. N. Bates. 1925.
42. How to pick chickens. 1925.
43. Lessons on cotton for elementary schools. F. A. Merrill. 1925.
44. Forest fire control. John McLaren. 1925.
45. List of technical workers in the Department of Agriculture, 1924–1925.
46. A bibliography of the European corn borer (*Pyrausta nubilalis* Hbn.). J. S. Wade. 1925.
47. What the national forests mean to the intermountain region. Frederick S. Baker. 1925.
52. Certification of coal-tar food colors. 1925.
53. When fire is banished from the land of the white oak. 1925.
54. Efficient methods of retailing meat. Roy C. Lindquist. 1925.
60. Federal legislation providing for Federal aid in highway construction, the construction of national forest roads and trails, and the distribution of surplus war materials: Rules and regulations of the Secretary of Agriculture for carrying out the Federal Highway Act and amendments thereto. Rules and regulations for administering forest roads and trails. 1925.

NOTE.—Numbers omitted have not been published. (December 31, 1925.)

YEARBOOKS AND YEARBOOK SEPARATES (REPRINTS)

1900 Yearbook.
Report of the Secretary. James Wilson.
192. Rabies: Its cause, frequency, and treatment. D. E. Salmon. 1901.
193. Agricultural education in France. C. B. Smith. 1901.
194. The food of nestling birds. Sylvester D. Judd. 1901.
195. Successful wheat growing in semiarid districts. Mark Alfred Carleton. 1901.
196. Smyrna fig culture in the United States. L. O. Howard. 1901.
197. How birds affect the orchard. F. E. L. Beal. 1901.
198. Directory for farmers. 1901.
199. Dairy products at Paris Exposition of 1900. Henry E. Alvord. 1901.
200. Statistics of the principal crops and farm animals. 1901.
201. Practical irrigation. C. T. Johnston and J. D. Stannard. 1901.
202. Amplification of weather forecasts. Alfred J. Henry. 1901.
203. Commercial plant introduction. Jared G. Smith. 1901.
204. The selection of material for macadam roads. Logan Waller Page. 1901.
205. Hot waves: Conditions which produce them, and their effect on agriculture. Alvin T. Burrows. 1901.
206. Some poisonous plants of the northern stock ranges. V. K. Chestnut. 1901.
207. The scale insect and mite enemies of citrus trees. C. L. Marlatt. 1901.
208. Fungous diseases of forest trees. Hermann von Schrenk. 1901.
209. Influence of rye on the price of wheat. Edward T. Peters. 1901.
210. Mountain roads. James W. Abbott. 1901.
211. The world's exhibit of leaf tobacco at the Paris Exposition of 1900. Marcus L. Floyd. 1901.
212. Forest extension in the Middle West. William L. Hall. 1901.
213. The value of potatoes as food. C. F. Langworthy. 1901.
214. Practical forestry in the southern Appalachians. Overton W. Price. 1901.
215. Commercial pear culture. M. B. White. 1901.
216. Objects and methods of investigating certain physical properties of soils. Lyman J. Briggs. 1901.
217. Development of the trucking interests. F. S. Earle. 1901.
218. The date palm and its culture. Walter T. Swingle. 1901.
219. Free delivery of rural mails. Charles H. Greathouse. 1901.
220. Testing commercial varieties of vegetables. W. W. Tracy, jr. 1901.
221. The use and abuse of food preservatives. W. D. Bigelow. 1901.
222. The influence of refrigeration on the fruit industry. William A. Taylor. 1901.
223. Our native pasture plants. F. Lamson-Scribner. 1901.
224. William Saunders. Geo. Wm. Hill. 1901.

1901 Yearbook.
Report of the Secretary. James Wilson.
225. The relation of nutrition to the health of plants. Albert F. Woods. 1902.
226. Mohair and mohair manufactures. George Fayette Thompson. 1902.
227. The prairie dog of the Great Plains. C. Hart Merriam. 1902.
228. Some typical reservoirs in the Rocky Mountain States. Elwood Mead. 1902.
229. Little-known fruit varieties considered worthy of wider dissemination. William A. Taylor. 1902.
230. Commercial apple orcharding. G. B. Brackett. 1902.
231. The tuberculin test for tuberculosis. D. E. Salmon. 1902.
232. The purpose of a soil survey. Milton Whitney. 1902.
233. Some problems of the rural common school. A. C. True. 1902.
234. The future demand for American cotton. J. L. Watkins. 1902.
235. Insects as carriers and spreaders of disease. L. O. Howard. 1902.
236. The timber resources of Nebraska. William L. Hall. 1902.
237. Progress in plant and animal breeding. Willet M. Hays. 1902.
238. Agricultural seeds: Where grown and how handled. A. J. Pieters. 1902.
239. The cottonseed industry. Charles M. Daugherty. 1902.
240. Road building with convict labor in the Southern States. J. A. Holmes. 1902.
241. Grazing in the forest reserves. Filibert Roth. 1902.
242. Agriculture in the tropical islands of the United States. O. F. Cook. 1902.
243. The present status of the Mexican cotton-boll weevil in the United States. W. D. Hunter. 1902.
244. Dietaries in public institutions. W. O. Atwater. 1902.

1901 Yearbook—Continued.
245. Government cooperation in object-lesson road work. Martin Dodge. 1902.
246. The home fruit garden. L. C. Corbett. 1902.
247. Two vanishing game birds—the woodcock and the wood duck. A. K. Fisher. 1902.
248. Experimental work with fungous diseases of grasshoppers. L. O. Howard. 1902.
249. A working plan for southern hardwoods, and its results. John Foley. 1902.
250. Floods and flood warnings. H. C. Frankenfield. 1902.
251. Progress of the beet-sugar industry in the United States. Charles F. Saylor. 1902.
252. Agricultural investigations in the island possessions of the United States. Walter H. Evans. 1902.
253. Mountain roads as a source of revenue. James W. Abbott. 1902.
254. The hemp industry in the United States. Lyster H. Dewey. 1902.
255. The Chinook winds. Alvin T. Burrows. 1902.
256. Wheat ports of the Pacific coast. Edwin S. Holmes, jr. 1902.
257. Influence of environment on the chemical composition of plants. H. W. Wiley. 1902.
258. Statistical matter relating to principal crops and farm animals, freight exports, etc., in United States. 1902.
259. Directory for farmers. 1902.

1902 Yearbook.
Report of the Secretary. James Wilson.
260. Dairying at home and abroad. Henry E. Alvord. 1903.
261. San José scale: Its native home and natural enemy. C. L. Marlatt. 1903.
262. The contamination of public water supplies by algæ. George T. Moore. 1903.
263. Audubon societies in relation to the farmer. Henry Oldys. 1903.
264. Industrial progress in plant work. B. T. Galloway. 1903.
265. Some engineering features of drainage. C. G. Elliott. 1903.
266. Top working orchard trees. G. Harold Powell. 1903.
267. The educational value of livestock exhibitions. George M. Rommell. 1903.
268. Some of the principal insect enemies of coniferous forests in the United States. A. D. Hopkins. 1903.
269. Climate of the forest-denuded portion of the upper Lake region. Willis L. Moore. 1903.
270. Practicability of forest planting in the United States. William L. Hall. 1903.
271. Wet and dry seasons in California. Alexander G. McAdie. 1903.
272. Analysis of waters and interpretation of the results. J. K. Haywood. 1903.
273. Distribution and magnitude of the poultry and egg industry. George Fayette Thompson. 1903.
274. The influence of forestry upon the lumber industry. Overton W. Price. 1903.
275. The agaves, a remarkable group of useful plants. E. W. Nelson. 1903.
276. Chemical studies of some forest products of economic importance. William H. Krug. 1903.
277. Bacteria and the nitrogen problem. George T. Moore. 1903.
278. Systems of farm management in the United States. W. J. Spillman. 1903.
279. Improvement of cotton by seed selection. Herbert J. Webber. 1903.
280. The cost of food as related to its nutritive value. R. D. Milner. 1903.
281. Grape raisin, and wine production in the United States. George C. Husmann. 1903.
282. Flaxseed production, commerce, and manufacture in the United States. Charles M. Daugherty. 1903.
283. Promising new fruits. William A. Taylor. 1903.
284. Plants as a factor in home adornment. L. C. Corbett. 1903.
285. Progress in secondary education in agriculture. A. C. True. 1903.
286. Selecting and judging horses for market and breeding purposes. W. J. Kennedy. 1903.
287. Improvement of corn by seed selection. C. P. Hartley. 1903.
288. Tests on the physical properties of timber. F. E. Olmsted. 1903.
289. Practices in crop rotation. George K. Holmes. 1903.
290. Fertilizers for special crops. A. F. Woods and R. E. B. McKenney. 1903.
291. Crops used in the reclamation of alkali lands in Egypt. Thomas H. Kearney and Thomas H. Means. 1903.
292. Some practical results of experiment station work. W. H. Beal. 1903.
293. Cultivation and fertilization of peach orchards. M. B. Waite. 1903.
294. Rainfall and irrigation. Edward A. Beals. 1903.
295. Foot and-mouth disease. D. E. Salmon. 1903.
296. Use of mineral oil in road improvement. James W. Abbott. 1903.
297. Directory for farmers. 1903.
298. Statistical matter relating to principal crops and animals, etc., 1902. 1903.
299. The principal injurious insects in 1902. F. H. Chittenden. 1903.
300. Agricultural periodicals in the department library, 1902. 1903.

1903 Yearbook.
Report of the Secretary. James Wilson.
301. Weather Bureau stations and their duties. James Kenealy. 1904.
302. Relation of precipitation to yield of corn. J. Warren Smith. 1904.
303. Relations of Federal Government to control of contagious diseases of animals. D. E. Salmon. 1904.
304. The Nation's farm surplus. George K. Holmes. 1904.
305. Progress of road building in the Middle West. R. W. Richardson. 1904.
306. Some soil problems for practical farmers. E. C. Chilcott. 1904.
307. Use of Weather Bureau records in court. Henry J. Cox. 1904.
308. Consumption of cotton in the cotton States. J. L. Watkins. 1904.
309. The economic value of the bobwhite. Sylvester D. Judd. 1904.
310. The cultivation of corn. C. P. Hartley. 1904.
311. Some results of investigations in soil management. F. H. King. 1904.
312. The farmers' institutes. John Hamilton. 1904.

1903 Yearbook—Continued.
313. The United States Department of Agriculture and silk culture. L. O. Howard. 1904.
314. The growing of long-staple upland cottons. Herbert J. Webber. 1904.
315. Recent progress in timber preservation. Hermann von Schrenk. 1904.
316. The status of the Mexican cotton-boll weevil in the United States in 1903. W. D. Hunter. 1904.
317. Relation of cold storage to commercial apple culture. G. Harold Powell. 1904.
318. Preparing land for irrigation. R. P. Teele. 1904.
319. The industry in oil seeds. Charles M. Daugherty. 1904.
320. Relation of sugar beets to general farming. C. O. Townsend. 1904.
321. Principal commercial plant fibers. Lyster H. Dewey. 1904.
322. Some new facts about the migration of birds. Wells W. Cooke. 1904.
323. A model farm. W. J. Spillman. 1904.
324. Wheat flour and bread. Harry Snyder and Charles D. Woods. 1904.
325. Cultivation of drug plants in the United States. Rodney H. True. 1904.
326. Macaroni wheat. James H. Shepard. 1904.
327. Insect injuries to hardwood forest trees. A. D. Hopkins. 1904.
328. Determination of effect of preservatives in foods on health and digestion. H. W. Wiley. 1904.
329. The relation of forests to stream flow. James W. Toumey. 1904.
330. Promising new fruits. William A. Taylor. 1904
331. The adulteration of drugs. Lyman F. Kebler. 1904.
332. Building sand-clay roads in Southern States. W. L. Spoon. 1904.
333. Directory for farmers. 1904.
334. Statistical matter relating to principal crops, farm animals, freight rates, exports, etc., in United States in 1903. 1904.
335. Principal injurious insects of 1903. F. H. Chittenden. 1904.

1904 Yearbook.
Report of the Secretary. James Wilson.
336. The relation of plant physiology to the development of agriculture. Albert F. Woods. 1905.
337. Attitude of lumbermen toward forest fires. E. A. Sterling. 1905.
338. Relation of weather conditions to growth and development of cotton. J. B. Marbury. 1905.
339. Inspection of foreign food products. H. W. Wiley. 1905.
340. Opportunities in agriculture:
Growing crops under glass. B. T. Galloway. 1905.
Fruit growing. M. B. Waite. 1905.
General farming. W. J. Spillman. 1905.
341. Present status of the cotton boll weevil in the United States. W. D. Hunter. 1905.
342. The respiration calorimeter. W. O. Atwater and F. G. Benedict. 1905.
343. New citrus creations of the Department of Agriculture. Herbert J. Webber and Walter T. Swingle. 1905.
344. The relation of birds to fruit growing in California. F. E. L. Beal. 1905.
345. Forest planting and farm management. George L. Clothier. 1905.
346. Agricultural development in Argentina. Frank W. Bicknell. 1905.
347. The castor-oil industry. Charles M. Daugherty. 1905.
348. The nut weevils. F. H. Chittenden. 1905.
349. Potato culture near Greeley, Colo. J. Max Clark. 1905.
350. Practical road building in Madison Co., Tennessee. Sam C. Lancaster. 1905.
351. Sugar-beet seed breeding. J. E. W. Tracy. 1905.
352. The Weather Bureau and the homeseeker. Edward L. Wells. 1905.
353. Detection of cottonseed oil in lard. L. M. Tolman. 1905.
354. Some uses of the grapevine and its fruit. George C. Husmann. 1905.
355. Insect injuries to forest products. A. D. Hopkins. 1905.
356. Promising new fruits. William A. Taylor. 1905.
357. Consumers' fancies. George K. Holmes. 1905.
358. The improvement of tobacco by breeding and selection. Archibald D. Shamel. 1905.
359. The determination of timber values. Edward A. Bruniff. 1905.
360. The annual loss occasioned by destructive insects in the United States. C. L. Marlatt. 1905.
361. Cotton culture in Guatemala. O. F. Cook. 1905.
362. Boys' agricultural clubs. Dick J. Crosby. 1905.
363. Work of the Bureau of Plant Industry in meeting the ravages of the boll weevil, and some diseases of cotton. B. T. Galloway. 1905.
364. Some benefits the farmer may derive from game protection. T. S. Palmer. 1905.
365. State publications on agriculture. Charles H. Greathouse. 1905.
366. Animal breeding and feeding investigations by the Bureau of Animal Industry. D. E. Salmon. 1905.
367. Plant diseases in 1904. W. A. Orton. 1905.
368. The principal injurious insects in 1904. F. H. Chittenden. 1905.
369. Directory for farmers. 1905.
370. Statistical matter. 1905.
371. Game protection in 1904. T. S. Palmer. 1905.
372. Progress of forestry in 1904. Quincy R. Craft. 1905.

1905 Yearbook.
Report of the Secretary. James Wilson.
373. The gypsy and brown-tail moths and their European parasites. L. O. Howard. 1906.
374. How parasites are transmitted. B. H. Ransom. 1906.
375. Some ways in which the Department of Agriculture and the experiment stations supplement each other. E. W. Allen. 1906.
376. How to grow young trees for forest planting. E. A. Sterling. 1906.

1905 Yearbook—Continued.

377. Diversified farming in the Cotton Belt: I. South Atlantic Coast. W. J. Spillman. II. Alabama and Mississippi. M. A. Crosby. III. Louisiana, Arkansas, and northeastern Texas. D. A. Brodie. IV. Texas. C. W. Warburton. 1906.
378. Dark fire-cured tobacco of Virginia and the possibilities for its improvement. George T. McNess and E. H. Mathewson. 1906.
379. Extension of the river and flood service of the Weather Bureau. H. C. Frankenfield. 1906.
380. Table sirups. H. W. Wiley. 1906.
381. Insect enemies of forest reproduction. A. D. Hopkins. 1906.
382. The use of illustrative material in teaching agriculture in rural schools. Dick J. Crosby. 1906.
383. New fruit productions of the Department of Agriculture. Herbert J. Webber. 1906.
384. The business of seed and plant introduction and distribution. A. J. Pieters. 1906
385. Fruit and its uses as food. C. F. Langworthy. 1906.
386. The principal insect enemies of the peach. A. L. Quaintance. 1906.
387. The handling of fruit for transportation. G. Harold Powell. 1906.
388. Meadow mice in relation to agriculture and horticulture. D. E. Lantz. 1906.
389. The effect of inbreeding in plants. A. D. Shamel. 1906.
390. Renovated butter: Its origin and history. Levi Wells. 1906.
391. Ostrich farming in Arizona. Watson Pickrell. 1906.
392. Illustrations of the influence of experiment station work on culture of field crops. J. I. Schulte. 1906.
393. The relation of irrigation to dry farming. Elwood Mead. 1906.
394. New opportunities in subtropical fruit growing. P. H. Rolfs. 1906.
395. Prolonging the life of telephone poles. Henry Grimmell. 1906.
396. Farm practice in the control of field-crop insects. F. M. Webster. 1906.
397. Formaldehyde: Its composition and uses. Bernard H. Smith. 1906.
398. Waste in logging southern yellow pine. J. Girvin Peters. 1906.
399. Promising new fruits. William A. Taylor. 1906.
400. Causes affecting farm values. George K. Holmes. 1906.
401. Progress in drug-plant cultivation. Rodney H. True. 1906.
402. Federal game protection: A five years' retrospect. T. S. Palmer. 1906.
403. Game protection in 1905. T. S. Palmer. 1906.
404. Statistical matter relating to principal crops and farm animals, freight rates, exports, etc., of the United States, 1905. 1906.
405. A directory for farmers (corrected to April 1, 1906), with weather conditions, crop injuries, etc., for 1905. 1906.
406. Progress of forestry in 1905. Quincy R. Craft. 1906.
407. Progress of road legislation and road improvement in the different States. 1906.
408. The principal injurious insects of 1905. 1906.
409. Plant diseases in 1905. W. A. Orton. 1906.

1906 Yearbook.

Report of the Secretary. James Wilson.
410. New problems of the weather. Willis L. Moore, W. J. Humphreys, and O. L. Fassig. 1907.
411. The present status of the nitrogen problem. A. F. Woods. 1907.
412. Object-lesson roads. Logan Waller Page. 1907.
413. Introduction of elementary agriculture into schools. A. C. True. 1907.
414. Cage-bird traffic of the United States. Henry Oldys. 1907.
415. The use of soil surveys. J. A. Bonsteel. 1907.
416. Birds that eat scale insects. W. L. McAtee. 1907.
417. The effect of climatic conditions on the composition of durum wheat. J. A. LeClerc. 1907.
418. The game warden of to-day. R. W. Williams, jr. 1907.
419. Range management. J. S. Cotton. 1907.
420. The preparation of unfermented apple juice. H. C. Gore. 1907.
421. Foreign restrictions on American meat. Frank R. Rutter. 1907.
422. Methods of reducing the cost of producing beet sugar. C. O. Townsend. 1907.
423. Corn-breeding work at the experiment stations. J. I. Schulte. 1907.
424. Nuts and their uses as food. M. E. Jaffa. 1907.
425. Some recent studies of the Mexican cotton-boll weevil. W. D. Hunter. 1907.
426. Cloud-bursts, so called. Edward L. Wells. 1907.
427. New citrus and pineapple productions of the Department of Agriculture. Herbert J. Webber. 1907.
428. Distribution of tuberculin and mallein by the Bureau of Animal Industry. M. Dorset. 1907.
429. Promising new fruits. William A. Taylor. 1907.
430. Freight costs and market values. Frank Andrews. 1907.
431. New tobacco varieties. A. D. Shamel. 1907.
432. Opportunities for dairying:
I. General. Wm. Hart Dexter. 1907. II. New England. George M. Whitaker. 1907. III. The North Central States. B. D. White. 1907. IV. The South. B. H. Rawl. 1907. V. The Pacific Coast. E. A. McDonald. 1907.
433. Lime-sulphur washes for San José scale. A. L. Quaintance. 1907.
434. National forests and the lumber supply. Thomas H. Sherrard. 1907.
435. Directory for farmers. 1907.
436. Agricultural statistics, 1906. 1907.
437. Plant diseases in 1906. W. A. Orton. 1907.
438. The principal injurious insects in 1906. 1907.
439. Progress of forestry in 1906. Quincy R. Craft. 1907.
440. Game protection in 1906. T. S. Palmer. 1907.

1907 Yearbook.

Report of the Secretary. James Wilson.
441. Progress in some of the new work of the Bureau of Plant Industry. Beverly T. Galloway. 1908.

1907 Yearbook—Continued.
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72. Progress of the beet-sugar industry in the United States in 1901. Charles F. Saylor, C. O. Townsend, and A. J. Pieters. 1902.
73. Report of the Secretary of Agriculture, 1902. James Wilson. 1902.
74. Progress of the beet-sugar industry in the United States in 1902. Charles F. Saylor, Truman G. Palmer, J. E. W. Tracy, and F. H. Chittenden. 1903.
75. Indian corn in Argentina: Production and export. Frank W. Bicknell. 1903.
76. Report of the Secretary of Agriculture, 1903. James Wilson. 1903.
77. Alfalfa and beef production in Argentina. Frank W. Bicknell. 1904.

78. An enemy of the cotton boll weevil. O. F. Cook. 1904.
79. Report of the Secretary of Agriculture, 1904. James Wilson. 1904.
80. Progress of the beet-sugar industry in the United States in 1904. Charles F. Saylor, C. O. Townsend, and J. E. W. Tracy. 1905.
81. Report of the Secretary of Agriculture, 1905. James Wilson. 1905.
82. Progress of the beet-sugar industry in the United States in 1905. Charles F. Saylor. 1906.
83. Report of the Secretary of Agriculture, 1906. James Wilson. 1906.
84. Progress of the beet-sugar industry in the United States in 1906. Charles F. Saylor. 1907.
85. Report of the Secretary of Agriculture, 1907. James Wilson. 1907.
86. Progress of the beet-sugar industry in the United States in 1907. Charles F. Saylor. 1908.
87. Report of the Secretary of Agriculture, 1908. (Abridged edition.) James Wilson. 1908.
88. The influence of sodium benzoate on the nutrition and health of man. Russell H. Chittenden, John H. Long, and Dr. Christian A. Herter. 1909.
89. Durability and economy in papers for permanent records. H. W. Wiley and C. Hart Merriam. 1909.
90. Progress of the beet-sugar industry in the United States in 1908. Charles F. Saylor. 1909.
91. Report of the Secretary of Agriculture, 1909. (Abridged edition.) James Wilson. 1909.
92. Progress of the beet-sugar industry in the United States in 1909. Charles F. Saylor, J. E. W. Tracy, and Harry B. Shaw. 1910.
93. Report of the Secretary of Agriculture, 1910. (Abridged edition.) James Wilson. 1911.
94. Influence of saccharin on the nutrition and health of man. Christian A. Herter and Otto Folin. 1911.
95. The agricultural possibilities of the Canal Zone. Part I. Reconnaissance soil survey. Hugh H. Bennett. Part II. The outlook for agriculture. Wm. A. Taylor. 1912.
96. Soils of the prairie regions of Alabama and Mississippi and their use for alfalfa. Part I. Houston clay and associated soils. Hugh H. Bennett. Part II. Alfalfa on the Houston clay: Its culture and management. M. A. Crosby. 1911.
97. Influence of vegetables greened with copper salts on the nutrition and health of man. Alonzo E. Taylor, John H. Long, Russell H. Chittenden, and Theobald Smith. 1913.
98. Systems of marketing farm products and demand for such products at trade centers. George K. Holmes. 1913.
99. Classification of the cryphalinae, with descriptions of new genera and species. A. D. Hopkins. 1915.
100. Potash from kelp: Part I. Pacific kelp beds as a source of potassium salts. Frank K. Cameron. Part II. The kelp beds from lower California to Puget Sound. W. C. Crandall. Part III. The kelp beds of Puget Sound. George B. Rigg. Part IV. The kelp beds of southeast Alaska. T. C. Frye. Part V. The kelp beds of western Alaska. George B. Rigg. 1915.
101. The woolly apple aphis. A. C. Baker. 1915.
102. Descriptions of some weevils reared from cotton in Peru. W. Dwight Pierce. 1915.
103. Social and labor needs of farm women. Extracts from letters received from farm women. 1915.
104. Domestic needs of farm women. Extracts from letters received from farm women. 1915.
105. Educational needs of farm women. Extracts from letters received from farm women. 1915.
106. Economic needs of farm women. Extracts from letters received from farm women. 1915.
107. Larvae of the prioninae. Contributions toward a classification and biology of the North American cerambycidae. F. C. Craighead. 1915.
108. The acarina or mites. Nathan Banks. 1915.
109. Meat situation in the United States: Part I. Statistics of livestock, meat production, and consumption prices, and international trade for many countries. George K. Holmes. 1916.
110. Meat situation in the United States: Part II. Livestock production in the 11 far western range States. Will C. Barnes and James T. Jardine. 1916.
111. Meat situation in the United States. Part III. Methods and cost of growing beef cattle in the Corn Belt States. J. S. Cotton, Morton O. Cooper, W. F. Ward, and S. H. Ray. 1916.
112. Meat situation in the United States. Part IV. Utilization and efficiency of available American feed stuffs. W. F. Ward and S. H. Ray. 1916.
113. Meat situation in the United States. Part V. Methods and cost of marketing livestock and meats. Louis D. Hall, F. M. Simpson, and S. W. Doty. 1916.
114. Studies of the lumber industry. Part I. Some public and economic aspects of the lumber industry. William B. Greeley. 1917.
115. Studies of the lumber industry. Part VIII. The distribution of softwood lumber the Middle West. Wholesale distribution. Ovid M. Butler. 1918.
116. Studies of the lumber industry. Part IX. The distribution of softwood lumber in the Middle West. Retail distribution. Ovid M. Butler. 1918.
117. Studies of the lumber industry: Part XI. The substitution of other materials for wood. Rolf Thelen. 1917.

UNNUMBERED PUBLICATIONS

Political assessments. 1902.
The presence of Government representatives upon Indian reservations. 1902.
Opinions of the Attorney General relating to the scope and meaning of the act of July 1, 1902, 32 Statute 632, Public 223. Regulating the branding of dairy and food products for interstate commerce. 1903.
Notice to exporters of dessicated fruits. 1904.

Extension work in agriculture. 1906.
Hearing before the commission appointed by the Secretaries of the Treasury, Commerce and Labor, and Agriculture, to make uniform rules and regulations for carrying into effect the provisions of the food and drugs act, Public No. 384, approved June 30, 1906.
Actinidia chinensis, yangtaw. 1908.
Bambusa arundinacea, bamboo. 1908.
Food and drugs act, June 30, 1906. 1908.
Macadamia ternifolia, Queensland nut. 1908.
Project statements. Description and use. 1908.
Report of the Secretary of Agriculture on the southern Appalachian and White Mountain watersheds. James Wilson. 1908.
Sapium sebiferum, tallow tree. 1908.
Temporary appointments. [Circular letter.] 1908.
The 28-hour law, June 29, 1906. 1908.
Transfers. [Circular letter.] 1908.
Address delivered by W. M. Hays, Assistant Secretary of Agriculture, before the National Farm Land Congress, Chicago, Ill.; November 17, 1909. 1909.
Before the honorable, the Attorney General of the United States re labeling of Canadian Club whiskey under the food and drugs act of June 30, 1906. Question submitted by the Secretary of Agriculture. Brief of the solicitor. 1911.
Before the honorable, the Attorney General of the United States in re lard substitute, composed of 80 per cent of vegetable oils and 20 per cent of imported oleo stearin, under the meat inspection law. Question submitted by the Secretary of Agriculture. Brief of the solicitor. 1911.
Before the honorable, the Attorney General of the United States in re the inspection, under the act of June 30, 1906, of meat food products derived from the carcasses of animals which did not receive a post-mortem inspection under that act. Question submitted by the Secretary of Agriculture. Brief of the solicitor. 1911.
Instructions regarding the collection of samples under the insecticide act of 1910. 1911.
Regulations governing leaves of absence in the Department of Agriculture. James Wilson. 1911.
Report of the committee of bureau chiefs. (A. D. Melvin, chairman.) 1911.
Cooperative laboratory at Reno, Nev., for the examination of potash-bearing materials. 1912.
List of free and available publications of the Department of Agriculture of interest to farm women. 1913.
Manual of procedure for the guidance of commissioned officials, collaborating State chemists, and officials of the United States Department of Agriculture in connection with cooperative work in the enforcement of the food and drugs act, June 30, 1906. 1913.
Organization and conduct of a market service in the Department of Agriculture, discussed at a conference held at the department on April 29, 1913. 1913.
Promotions based on efficiency. 1913.
The relation of the Department of Agriculture to agricultural colleges and experiment stations. B. T. Galloway. 1913.
Preparation of articles for the Journal of Agricultural Research. 1914. Rev. 1917.
Program of work of the Department of Agriculture, 1915. 1914.
Program of work of the Department of Agriculture, 1916. E. H. Bradley. 1915.
Program of work of the Department of Agriculture, 1917. E. H. Bradley. 1916.
Program of work of the Department of Agriculture, 1919. E. H. Bradley. 1919.
Are you feeding cattle or ticks? 1915.
Grain farming in the Corn Belt, with all bulletins to which reference is made. Carl Vrooman. 1916.
Quarantine on stone and quarry products on account of gypsy moth, with regulations. D. F. Houston. 1916.
Regulations governing the publication of reports and the information utilized in the compilation of reports, prepared by the Bureau of Crop Estimates, concerning the acreages, conditions, yields, farm reserves, or quality of products of the soil grown within the United States. 1916. Effective January 1, 1917. 1916.
A manual of dangerous insects likely to be introduced in the United States through importation. W. Dwight Pierce. 1917. Rev. 1918.
Announcing a food production syndicate service for afternoon newspapers. 1917.
Announcing an agricultural, dairying, poultry raising, and household syndicate service for weekly newspapers. 1917.
Certificate of deduction and apportionment by the Secretary of Agriculture for the fiscal year 1915 under an act to provide that the United States shall aid States in construction of rural post roads, approved July 11, 1916. 1917. Revised, 1919; 1921; 1922; 1923.
Food crops must be increased. Food production statements by the Secretary of Agriculture, D. F. Houston. 1917.
Food production report submitted to the Senate. D. F. Houston. 1917.
Standards governing the form and arrangement of plans, specifications, and estimates for Federal aid projects as provided for in the rules and regulations of the Secretary of Agriculture for carrying out the Federal aid road act, except section 8 thereof. 1917.
The farm labor problem. D. F. Houston. 1917.
The Liberty loan and the farmer. D. F. Houston. 1917.
War emergency food survey: Detailed survey of retail concerns, New York City. 1917.
War emergency food survey: Household inventory and consumption record. 1917.
Wastes. The leaks in a nation's strength. 1917.
Crop report regulations:
Effective January 1, 1918. 1918.
Effective January 1, 1919. 1918.
Effective January 1, 1920. 1920.
Effective January 1, 1921. 1921.
Effective January 1, 1922. 1922.
Effective January 1, 1923. 1923. (Miscellaneous Circular 20.)
Effective January 1, 1925. 1925. (Miscellaneous Circular 87.)
Notice to shippers of shelled corn regarding loading of cars. 1918. (In cooperation with the Railroad Administration.) Rev. 1919.

Remarks of D. F. Houston, Secretary of Agriculture, at the conference of editors of agricultural journals, Washington, D. C., Nov. 20, 1918. 1918.
Steps to victory. David F. Houston. Address delivered before the Economic Club, New York City, December 6, 1917. 1918
Supplying the farm labor need. G. I. Christie and Clarence Du Bose. 1918.
The business of agriculture during the war and after. Discussion of the Nation's most vital industry, by D. F. Houston, Secretary of Agriculture; R. A. Pearson, Assistant Secretary; and Clarence Ousley, Assistant Secretary. 1918.
The city's part in solving the farm labor problem. David F. Houston. 1918.
The food production outlook. 1918. D. F. Houston. 1918.
Why we went to war. David F. Houston. 1918.
Women on the farm. Clarence Ousley. 1918.
Address by D. F. Houston, Secretary of Agriculture, before the American National Live-stock Association, Denver, Colo., January 22, 1919. 1919.
Arbor Day. 1919. D. F. Houston. 1919.
Just a word about grain dust explosions. (In cooperation with the United States Grain Corporation.) 1919.
Need of strong departments of agriculture in the States. Remarks of D. F. Houston, Secretary of Agriculture, before the National Association of Commissioners of Agriculture at Baltimore, Md., January 7, 1919. 1919.
Report of the agricultural commission to Europe. Observations made by American agriculturists in Great Britain, France, and Italy for the United States Department of Agriculture. 1919.
To-day and to-morrow in American agriculture. Remarks of D. F. Houston, Secretary of Agriculture, before the Association of American Agricultural Colleges and Experiment Stations, at Baltimore, Md., January 8, 1919. 1919.
Your carelessness may destroy the plant you work in, kill your fellow workmen, lose your job. Protect your plant. Prevent fires and explosions. 1920.
Rules and regulations of the Secretary of Agriculture for administering forest roads and trails under the provisions of the Federal highway act. 1922.
Intermediate credit for the farmer. A pamphlet containing questions and answers on intermediate credit as provided for in the agricultural credits act of 1923 and essential facts showing the need of it. 1923.
The wheat situation. A report to the President. Henry C. Wallace. 1923.

UNNUMBERED PUBLICATIONS—SPECIAL

Advantages of dairying in the South. 1914.
Conveniences for handling the farm cow and her products. 1914.
Do you keep a cow? 1914.
Feeding the farm cow in the South. 1914.
Hairy vetch in the Cotton Belt. C. V. Piper. 1914.
Horse and mule raising in the South. 1914.
How southern farmers may get a start in pig raising. 1914.
Making farm butter in the South. 1914.
Marketing butter and cream in the South. 1914.
Permanent pastures for the Cotton Belt. Lyman Carrier. 1914.
Producing sheep on southern farms. 1914.
Rape as a forage crop in the Cotton Belt. C. V. Piper. 1914.
Rye in the Cotton Belt. Clyde E. Leighty. 1914.
Shall southern farmers build creameries? 1914.
Sorghum for forage in the Cotton Belt. H. N. Vinall. 1914.
Suggestions on poultry raising for the southern farmer. 1914.
The adulteration and misbranding of the seeds of Kentucky bluegrass and redtop. William A. Taylor. 1914.
The feeding and care of dairy calves. 1914.
The production and care of milk and cream. 1914.
Winter oats in the Cotton Belt. C. W. Warburton. 1914.
Winter wheat in the Cotton Belt. Clyde E. Leighty. 1914.
Cowpeas in the Cotton Belt. W. J. Morse. 1915.
Notice regarding foot-and-mouth disease. 1915.
Rules and regulations for the government of the watch force of the United States Department of Agriculture. 1915.
Soy beans in the Cotton Belt. W. J. Morse. 1915. Reprinted 1917 as States Relations Service Document 45.
Sweet-potato growing in the Cotton Belt. H. C. Thompson. 1915.
Geography of the world's agriculture. V. C. Finch and O. E. Baker. 1917.
Peanut growing in the Cotton Belt. H. C. Thompson. 1915. Reprinted 1917 as States Relations Service Document 43.

DIVISION OF ACCOUNTS AND DISBURSEMENTS

ANNUAL REPORTS

1901. F. L. Evans.
1902. F. L. Evans.
1903. F. L. Evans.
1904. F. L. Evans.
1905. F. L. Evans.
1906. A. Zappone.
1907. A. Zappone.
1908. A. Zappone.
1909. A. Zappone.
1910. A. Zappone.
1911. A. Zappone.
1912. A. Zappone.
1913. A. Zappone.
1914. A. Zappone.
1915. A. Zappone.
1916. A. Zappone.
1917. A. Zappone.
1918. A. Zappone.
1919. A. Zappone.
1920. A. Zappone.
1921. A. Zappone.
1922. A. Zappone.
1923. A. Zappone.
1924. A. Zappone.
1925. Not published.

UNNUMBERED PUBLICATIONS

Fiscal regulations of the United States Department of Agriculture. (1898.) Revised, 1901; 1904; 1907; 1913. For later issues see advisory committee on finance and business methods.
[Pay regulations.] F. L. Evans. 1903.
Contract prices for supplies for Forest Service supply depot, Ogden, Utah, fiscal year 1910. 1909.
Compendium of official, southern, and western freight classifications with directions as to the manner of making shipments of freight for the Department of Agriculture. A. Zappone. 1910.
List of hotels throughout the United States offering special rates to employees of the Department of Agriculture. A. Zappone. 1910.

ADMINISTRATION OF GRAIN FUTURES ACT[1]

ANNUAL REPORT

1923. Chester Morrill, assistant to the secretary.

ADVISORY COMMITTEE ON FINANCE AND BUSINESS METHODS

UNNUMBERED PUBLICATIONS

Fiscal regulations of the United States Department of Agriculture, effective February 1, 1915. 1915. For earlier issues see Division of Accounts and Disbursements.
Amendments No. 1–4. 1915.
——— Effective December 1, 1917. 1917.
Amendments No. 1–11. 1919–1920.
——— Effective January 1, 1922. 1922.
——— Effective on and after October 1, 1922. 1923.
Property regulations of the United States Department of Agriculture. Effective July 1, 1916. 1916.
Amendment 1. 1916.
Amendments 2–4. 1920.
Administrative regulations. Revised to August 1, 1918.
Admendments 1–5. 1919–1920. For earlier issues see Department, unnumbered publications.
Travel regulations of the United States Department of Agriculture, effective July 1, 1921.
Regulations of the United States Department of Agriculture: Fiscal, property, administrative, 1924.
——— Appendix, provisions of law affecting the fiscal, property, and administrative regulations of the Department of Agriculture, 1924.

APPOINTMENT CLERK

ANNUAL REPORTS

1902. J. B. Bennett.
1903. J. B. Bennett.
1904. J. B. Bennett.
1905. Not published.
1906. J. B. Bennett.
1907. J. B. Bennett.
1908. J. B. Bennett.
1909. J. B. Bennett.
1910. J. B. Bennett.
1911. R. W. Roberts.
1912. R. W. Roberts.
1913. R. W. Roberts.

UNNUMBERED PUBLICATION

Regulations governing appointments and other changes affecting personnel in the field service of the Department of Agriculture. 1912.

CHIEF CLERK

UNNUMBERED PUBLICATIONS

Rules and regulations governing leaves of absence in the Department of Agriculture. Andrew Geddes. 1902.
(Circular letter.) Penalty envelopes. 1903.
Telephone service. 1906.
(Circular letter.) In relation to leaves of absence. 1907.

OFFICE OF EDITORIAL AND DISTRIBUTION WORK[2]

ANNUAL REPORTS

1924. L. J. Haynes.
1925. Not published.
See also Office of Information.

OFFICE OF EXHIBITS[3]

ANNUAL REPORTS

1922. Joseph W. Hiscox.
1923. Joseph W. Hiscox.

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[1] Name changed to "Grain Futures Administration July 1, 1923."
[2] Previous to July 1, 1923, the name of this office was "Division of Publications."
[3] Became part of Extension Service July 1, 1923.

OFFICE OF EXPERIMENT STATIONS [4]

ANNUAL REPORTS

1924. E. W. Allen. 1925. E. W. Allen.

HAWAII AGRICULTURAL EXPERIMENT STATION

Annual report

1924. J. M. Westgate, W. T. Pope, H. L. Chung, J. C. Ripperton, H. F. Willey, R. A. Goff, Mabel Greene. 1925.

Bulletins

49. The acid lime fruit in Hawaii. W. T. Pope. 1923.
50. The sweet potato in Hawaii. H. L. Chung. 1923.
51. The Guatemalan avocado in Hawaii. W. T. Pope. 1924.
52. Manganese chlorosis of pinapples: Its cause and control. Maxwell O. Johnson. 1924.
53. The Hawaiian tree fern as a commercial source of starch. J. C. Ripperton. 1924.
54. Edible canna in Hawaii. H. L. Chung and J. C. Ripperton. 1924.

PORTO RICO AGRICULTURAL EXPERIMENT STATION

Bulletin

30. Coffee varieties in Porto Rico. T. B. McClelland. 1924.

VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION

Annual report

1924. J. B. Thompson, W. M. Perry, and Maybin S. Baker. 1925.

Bulletin

5. Production of sweet-potato seedlings at the Virgin Islands Experiment Station John B. Thompson. 1925.

EXTENSION SERVICE

ANNUAL REPORTS

1924. C. W. Warburton. 1925. C. W. Warburton.

COOPERATIVE EXTENSION WORK

1923. Issued in 1924. 1924. Issued in 1925.

FOOD AND DRUG INSPECTION BOARD

UNNUMBERED PUBLICATIONS

Regulations and decisions concerning guaranties and serial numbers and their use. 1908.
See also Bureau of Chemistry.

GRAIN FUTURES ADMINISTRATION [6]

ANNUAL REPORT

1924. Chester Morrill. 1925. J. W. T. Duvel.

OFFICE OF INFORMATION

UNNUMBERED PUBLICATIONS

The Federal farm loan act. 1916.
How the South has helped beat the Kaiser. Push the cattle tick off the map. 1918.
See also Office of Editorial and Distribution Work; Division of Publication.

OFFICE OF MOTION PICTURES [3]

ANNUAL REPORT

1923. Fred W. Perkins.

NEW DEPARTMENT BUILDINGS COMMITTEE

ANNUAL REPORTS

1904. B. T. Galloway. 1907. B. T. Galloway.
1905. B. T. Galloway. 1908. B. T. Galloway.
1906. B. T. Galloway.

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[2] Became part of Extension Service July 1, 1923.
[4] Independent office previous to July 1, 1915; from then to July 1, 1923, under States Relations Service.
[5] For earlier reports see States Relations Service, Report on the receipts, expenditures and results in extension work in agriculture and home economics in the United States.
[6] Previous to July 1, 1923, the name of this office was "Administration of Grain Futures Act."

DIVISION OF PUBLICATIONS [1]

ANNUAL REPORTS

1901. George William Hill.
1902. George William Hill.
1903. George William Hill.
1904. George William Hill.
1905. George William Hill.
1906. George William Hill.
1907. Joseph A. Arnold.
1908. George William Hill.
1909. Joseph A. Arnold.
1910. Joseph A. Arnold.
1911. Joseph A. Arnold.
1912. Joseph A. Arnold.
1913. Joseph A. Arnold.
1914. Joseph A. Arnold.
1915. Joseph A. Arnold.
1916. Joseph A. Arnold.
1917. Joseph A. Arnold.
1918. Joseph A. Arnold.
1919. Edwy B. Reid.
1920. Edwy B. Reid.
1922. John L. Cobbs, jr.
1923. Edwin C. Powell.

BULLETINS

6. List by titles of publications of the United States Department of Agriculture from 1840 to June, 1901, inclusive. R. B. Handy and Minna A. Cannon. 1902.
7. Index to the yearbooks of the United States Department of Agriculture, 1894–1900. Charles H. Greathouse. 1902.
8. Index to farmers' bulletins. Nos. 1–250. Charles H. Greathouse. 1907.
9. Index to the yearbooks of the United States Department of Agriculture, 1901–1905. Charles H. Greathouse. 1908.
10. Index to the yearbooks of the United States Department of Agriculture, 1906–1910. Charles H. Greathouse. 1913.

CIRCULARS

1. Organization of Department of Agriculture, 1901–2. 1901. Revised to September 1, 1903; September 1, 1904; October 1, 1905; January 1, 1907; January 1, 1908; June 10, 1908; February 15, 1909; July 1, 1910; July 1, 1911; July 1, 1912.
2. Publications for free distribution. Revised to October 1, 1906; January 15, 1907; July 1, 1907; December 15, 1907; June 10, 1908; September 1, 1908; March 1, 1909; October 15, 1909; April 1, 1910; June 15, 1910.
3. Publications for sale. Revised to October 1, 1906; June 1, 1907; October 1, 1907; January 1, 1908; June 15, 1908; December 1, 1908; October 1, 1909; June 15, 1910; October 15, 1910.
4. Farmers' bulletin subject index. 1906. Revised to include Bulletin 273. 1907. Revised to include Bulletin 309. 1907. Revised to include Bulletin 320. 1908. Revised to include Bulletin 331. 1908. Revised to include Bulletin 351. 1909. Revised to include Bulletin 382. 1909.
5. Food and drugs index. 1908. Revised October, 1908.
6. Publications of the United States Department of Agriculture and how they are distributed. 1909.
7. Publications of the Bureau of Chemistry. January 21, 1911; March 15, 1911; September 30, 1911; January 5, 1912; February 23, 1912; October 21, 1912; January 23, 1913; March 10, 1913; July 3, 1913.
8. Publications of the Bureau of Biological Survey. January 28, 1911. Revised March 10, 1911; December 7, 1911; January 23, 1912; October 31, 1912; March 10, 1913; July 3, 1913.
9. Publications, Office of the Secretary, Office of the Solicitor, and the Division of Publications. February 11, 1911. Revised March 28, 1911; November 2, 1911; March 5, 1912; October 30, 1912; March 10, 1913; July 7, 1913.
10. Publications of the Office of Public Roads. February 18, 1911. Revised April 4, 1911; February 23, 1912; May 7, 1912; December 28, 1912; February 19, 1913; July 7, 1913.
11. Publications of the Forest Service. March 2, 1911. April 4, 1911. Revised June 28, 1911; December 7, 1911; February 10, 1912; May 6, 1912; September 19, 1912; January 25, 1913; April 3, 1913; July 3, 1913.
12. Publications of the Bureau of Statistics. March 2, 1911. Revised August 14, 1911; February 8, 1912; August 8, 1912; January 15, 1913; July 3, 1913.
13. Publications of the Bureau of Plant Industry. March 3, 1911. Revised August 14, 1911; December 12, 1911; February 8, 1912; May 8, 1912; November 11, 1912; March 8, 1913; July 9, 1913.
14. Publications of the Bureau of Soils. March 7, 1911. Revised September 18, 1911; December 7, 1911; February 13, 1912; September 19, 1912; February 1, 1913; June 25, 1913.
15. Publications of the Bureau of Animal Industry. March 8, 1911. Revised October 3, 1911; December 7, 1911; January 27, 1912; April 18, 1912; November 9, 1912; February 17, 1913; June 25, 1913.
16. Publications of the Bureau of Entomology. March 15, 1911. Revised December 7, 1911; February 23, 1912; October 24, 1912; January 24, 1913; June 26, 1913.
17. Publications of the Office of Experiment Stations. March 20, 1911. Revised May 4, 1911; August 14, 1911; November 7, 1911; January 27, 1912; April 27, 1912; January 23, 1913; June 26, 1913.
18. Publications of the Library. March 4, 1911. Revised November 7, 1911; January 13, 1912; March 5, 1912; November 29, 1912; February 20, 1913; June 26, 1913.
19. Publications of the Department of Agriculture classified for the use of teachers. 1912.

UNNUMBERED PUBLICATIONS

List of bulletins and circulars available for free distribution. 1902–1913. Corrected to January, 1902; January, 1903; September, 1903; January, 1904; June, 1904; November, 1904; July, 1905; April, 1906. (Ed. 7–14.)

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[1] Name changed July 1, 1923, to Office of Editorial and Distribution Work.

Speech by Hon. James Wilson, Secretary of Agriculture, delivered July 7, 1902, at the School of Agriculture, Columbus, Ohio. 1902.
Methods of studying effect of preservatives and other substances added to foods upon health and digestion. Address. [Harvey W. Wiley.] 1903.
Crop export movement. 1905.
Orris root culture, Rodney H. True. 1905.
Game conditions in January, 1906. 1906.
Cowpea seed. 1907.
Investigations of Neosho Valley floods by drainage engineers of United States Office of Experiment Stations. 1908.
The present status of the cotton-boll weevil. 1908.
Report of committee on charges of J. F. Harms against the meat inspection service. 1909.
Bulletins of Interest to persons residing in cities and towns: November, 1911; December, 1912; April, June, July, October, November, 1913; January, March, May, July, September, October, 1914; April, July, 1915; 1916; 1917; 1918; 1921; April, August, 1924.
Index of titles of farmers' bulletins available for distribution, Nos. 22–560. 1913.
Organization of the Department of Agriculture, 1913. 1913.
List of publications of the United States Department of Agriculture suggested for an agricultural reading course. 1914.
Alphabetical subject index of farmers' bulletins. August, 1915; December, 1916; November, 1917; December, 1918; June, 1919; April, 1920; July, 1921; May, 1922; January, 15, 1924; February 15, 1924.
Irrigation map of the United States. Outline map of the United States, by counties. 1915.
Complete list of Farmers' Bulletins issued to October 15, 1916. 1916.
Radio telephone stations distributing weather, market, and agricultural information of the United States Department of Agriculture, March 1, 1923. Map. 1923.
Lists of Farmers' Bulletins.
No. 1. Numerical list, April 25, 1924; February 25, 1925; September 1, 1925.
No. 2. Classified list, April 25, 1924; May 1, 1925; September 1, 1925.
No. 3. Bulletins of interest to persons who live in cities and towns. April 15, 1924; June 1, 1923.

OFFICE OF THE SOLICITOR

ANNUAL REPORTS

1907. George P. McCabe.
1908. George P. McCabe.
1909. George P. McCabe.
1910. George P. McCabe.
1911. George P. McCabe.
1912. George P. McCabe.
1913. Francis G. Caffey.
1914. Francis G. Caffey.
1915. Francis G. Caffey.
1916. Francis G. Caffey.
1917. William M. Williams.
1918. William M. Williams.
1919. William M. Williams.
1920. R. W. Williams.
1922. R. W. Williams.
1923. R. W. Williams.
1924. R. W. Williams.

CIRCULARS

1. Negligence of employee imputable to carrier: Decision of the United States District Court for the District of Montana in cases involving violations of the act of Congress of June 29, 1906 (34 Stat. 607), commonly known as "The 28-hour law." 1907.
2. Unit of violation under "The 28-hour law." 1908. Opinion of the Circuit Court of Appeals for the Sixth Circuit in cases involving violations of the act of Congress of June 29, 1906, commonly known as "The 28-hour law." 1908.
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[8] Known as the Office of Markets July 1, 1913, to July 1, 1914; as the Office of Markets and Rural Organization July 1, 1914, to July 1, 1917; as the Bureau of Markets July 1, 1917, to July 1, 1921; as the Bureau of Markets and Crop Estimates July 1, 1921, to July 1, 1922.

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[9] Became part of Bureau of Plant Industry July 1, 1901.
[10] See also Bureau of Dairying.

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76. The score card in stock breeding. George M. Rommel. 1905.
77. Cattle, sheep, and hog feeding in Europe. Willard John Kennedy. 1905.
78. Texas fever (otherwise known as tick fever, splenetic fever, or southern fever), with methods for its prevention. John R. Mohler. 1905.
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105. Varieties of cheese: Descriptions and analyses. C. F. Doane and H. W. Lawson. 1908.
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111. A chemical and physical study of the large and small fat globules in cows' milk. R. H. Shaw and C. H. Eckles. 1909.
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114. The influence of acidity of cream on the flavor of butter. L. A. Rogers and C. E. Gray. 1909.
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122. Factors controlling the moisture content of cheese curds. J. L. Sammis, S. K. Suzuki, and F. W. Laabs. 1910.
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130. Studies on the biology of the Texas-fever tick. H. W. Graybill. 1911.
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132. A bacteriological study of ham souring. C. N. McBryde. 1911.
133. The determination of nicotin in nicotin solutions and tobacco extracts. Robert M. Chapin. 1911.
134. The estimation of total solids in milk by the use of formulas. R. H. Shaw and C. H. Eckles. 1911.
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141. The improvement of the farm egg. Harry M. Lamon and Charles L. Opperman. 1911.
142. Dourine of horses: Its cause and suppression. John R. Mohler. 1911.
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35. Treatment for roundworms in sheep, goats, and cattle. Ch. Wardell Stiles. 1901.
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42. Information concerning common goats. George Fayette Thompson. 1903.
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86. Alfalfa for the growing and fattening of animals in the Great Plains region. I. D. Graham. 1905.
87. Hunter-horse production in Ireland. Willard John Kennedy. 1905.
88. Highland cattle. John Roberts. 1905.
89. The preparation of emulsions of crude petroleum. T. M. Price. 1905.
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93. The life history of the twisted wireworm (*Hæmonchus contortus*) of sheep and other ruminants. B. H. Ransom. 1906.
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100. A rapid method for the determination of water in butter. C. E. Gray. 1906.
101. The new meat inspection law and its bearing upon the production and handling of meat. George P. McCabe. 1907.
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123. Instructions for preparing and shipping pathological specimens for diagnosis. George H. Hart. 1908.
124. Suggestions for horse and mule raising in the South. George M. Rommel. 1908.
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193. Our present knowledge of the distribution and importance of some parasitic diseases of sheep and cattle in the United States. Maurice C. Hall. 1912.

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DAIRY DIVISION—UNNUMBERED PUBLICATIONS

Publications of interest to dairymen, 1895–1905. 1905; 1895–1906. 1906; 1895–1907. 1907. Rev. 1909.
Buttermilk and artificial buttermilk. 1917.
Cottage cheese—an inexpensive meat substitute. 1917.
How to use skim milk. 1917.
Milk as a food. 1917.
Ten suggestions for milk consumers. 1917.
Ice. Do you have it on the farm? 1918.
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[9] Became part of Bureau of Plant Industry July 1, 1901.
[10] Organized as a division prior to 1902.

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87. Chemical composition of some tropical fruits and their products: I. A study of Cuban fruits. II. The composition of fresh and canned pineapples. Ed Mackay Chace, L. M. Tolman, and L. S. Munson. 1904.
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89. Injury to vegetation by smelter fumes. J. K. Haywood. 1905.
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92. The effect of water on rock powders. Allerton S. Cushman. 1905.
93. Experiments in the culture of sugar cane and its manufacture into table sirup. H. W. Wiley, G. L. Spencer, W. B. Roddenbery, G. R. Youmans, and Arthur Given. 1905.
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97. Studies on peaches: I. Compiled analyses of peaches. II. Changes in chemical composition of the peach during growth and ripening. III. Effect of storage on the composition of peaches. W. D. Bigelow and H. C. Gore. 1905.
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100. Some forms of food adulteration and simple methods for their detection. W. D. Bigelow and Burton J. Howard. 1906.
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102. Foreign trade practices in the manufacture and exportation of alcoholic beverages and canned goods. Summary of an investigation made in Great Britain and Ireland, Germany, and France. H. W. Wiley. 1906.
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104. Food legislation during the year ended June 30, 1906. W. D. Bigelow. 1906.
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106. Cassava: Its content of hydrocyanic acid and starch and other properties. Charles C. Moore. 1907.
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110. Chemical analysis and composition of American honeys. C. A. Browne. A microscopical study of honey pollen. W. J. Young. 1908.
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113. Injury to vegetation and animal life by smelter wastes. J. K. Haywood. 1908. Rev. 1910.
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115. A preliminary study of the effects of cold storage on eggs, quail, and chickens. H. W. Wiley, M. E. Pennington, C. W. Stiles, jr., B. J. Howard, and F. C. Cook. 1908.
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119. Experiments on the spoilage of tomato ketchup. A. W. Bitting. 1909.
120. The feeding value of cereals, as calculated from chemical analyses. Joseph S. Chamberlain. 1909.
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122. Proceedings of the twenty-fifth annual convention of the Association of Official Agricultural Chemists, Washington, D. C., November 12–16, 1908. 1909.
123. Metabolism of organic and inorganic phosphorus: A feeding experiment using phytin and sodium phosphates. F. C. Cook. 1909.
124. Chemical studies of American barleys and malts. J. A. LeClerc and Robert Wahl. 1909.
125. The canning of peas, based on factory inspection and experimental data. A. W. Bitting. 1909.
126. The harmful effects of acetanilid, antipyrin, and phenacetin. L. F. Kebler. F. P. Morgan, and Philip Rupp. 1909.
127. The influence of environment on the composition of sweet corn, 1905–1908. M. N. Straughn and C. G. Church. 1909.
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130. Manufacture of denatured alcohol. H. W. Wiley, H. E. Sawyer, L. M. Tolman, A. H. Bryan, A. Given, and H. W. Berger. 1910.
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132. Proceedings of the twenty-sixth annual convention of the Association of Official Agricultural Chemists, Denver, Colo., August 26–28, 1909. 1910.
133. Preparation of the cod and other salt fish for the market. A. W. Bitting. 1911.
134. Maple sap sirup: Its manufacture, composition, and effect of environment thereon. A. Hugh Bryan. 1910.
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137. Proceedings of the twenty-seventh annual convention of the Association of Official Agricultural Chemists, Washington, D. C., November 10–12, 1910. 1911.
138. Translocation of plant food and elaboration of organic plant material in wheat seedlings. J. A. Le Clerc and J. F. Breazeale. 1911.
139. American mineral waters: The New England States. W. W. Skinner. Bacteriological methods. G. W. Stiles, jr. 1911.
140. Enological studies. The occurrence of sucrose in grapes. The sugar and acid content of different varieties of grapes, sampled at frequent intervals during ripening and at full maturity. William B. Alwood. 1911.
141. Experiments on the processing of persimmons to render them nonastringent. H. C. Gore. Introduction by David Fairchild. 1911.

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143. The food laws of the United Kingdom and their administration. F. L. Dunlap. 1911.
144. Wood turpentine: Its production, refining properties, and uses. F. P. Veitch and M. G. Bonk. 1911.
145. Enological studies. The chemical composition of American grapes grown in Ohio, New York, and Virginia. William B. Alwood. 1911.
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147. Coal-tar colors used in food products. Bernhard C. Hesse. 1912.
148. The toxicity of caffein: An experimental study on different species of animals. William Salant and J. B. Rieger. 1912.
149. The growth of wheat seedlings as affected by acid or alkaline conditions. J. F. Breazeale and J. A. Le Clerc. 1912.
150. Technical drug studies: I. Examination of hydrogen dioxid solutions. L. F. Kebler, L. E. Warren, and E. A. Ruddiman. II. The purity of glycerin. L. F. Kebler and H. C. Fuller. III. Notes on two important alkaloidal reactions. H. C. Fuller. IV. The separation and identification of small quantities of cocain. H. C. Fuller. V. The determination of molybdic trioxid. B. Herstein. VI. A method for testing ammonium salts. B. Herstein. VII. Character of samples of beeswax submitted with bids. L. F. Kebler and F. M. Boyles. 1912.
151. The canning of foods: A description of the methods followed in commercial canning. A. W. Bitting. 1912.
152. Proceedings of the twenty-eighth annual convention of the Association of Official Agricultural Chemists, Washington, D. C., November 20–22, 1911. 1912.
153. Determination of lithium. W. W. Skinner and W. D. Collins. 1912.
154. Chemical analysis and composition of imported honey from Cuba, Mexico, and Haiti. A. H. Bryan, Arthur Given, and Sidney Sherwood. 1912.
155. Large scale experiments on the processing of Japanese persimmons; with notes on the preparation of dried persimmons. H. C. Gore. 1912.
156. Sewage-polluted oysters as a cause of typhoid and other gastro-intestinal disturbances. George W. Stiles, jr. 1912.
157. The elimination of caffein: An experimental study on herbivora and carnivora. William Salant and J. B. Rieger. 1912.
158. A bacteriological study of shell, frozen, and desiccated eggs; made under laboratory conditions at Washington, D. C., by George Whitfield Stiles, jr., and Carleton Bates. 1912.
159. Pulp and paper and other products from waste resinous woods. F. P. Veitch and J. L. Merrill. 1913.
160. A study of nuts with special reference to microscopic identification. W. J. Young. 1912.
161. Not published.
162. Proceedings of the twenty-ninth annual convention of the Association of Official Agricultural Chemists, Washington, D. C., September 16–18, 1912. 1913.
163. The composition of different varieties of red peppers. L. M. Tolman and L. C. Mitchell. 1913.
164. Graham flour: A study of the physical and chemical differences between graham flour and imitation graham flours. J. A. Le Clerc and B. R. Jacobs. 1913.
165. Leather investigations: The composition of some sole leathers. F. P. Veitch and J. S. Rogers. 1913.
166. The elimination and toxicity of caffein in nephrectomized rabbits. William Salant and J. B. Rieger. 1913.

CIRCULARS

7. Outline of work on foods and feeding stuffs for 1901. 1901.
8. Official method for analysis of tanning materials. 1901.
9. A plan for cooperating in the study of available plant food. C. C. Moore. 1902.
10. Methods for the analysis of insecticides and fungicides. J. K. Haywood. 1902.
11. Preliminary crop and soil data for the cooperative study of available plant food. C. C. Moore. 1903.
12. Methods for the investigation of canceling inks and other stamping inks. E. E. Ewell. 1903.
13. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1903. 1904.
14. Organization of the Bureau of Chemistry. 1904.
15. Results of borax experiment. H. W. Wiley. 1904.
16. Officials charged with the enforcement of food laws in the United States and Canada. 1904.
17. The useful properties of clays. Allerton S. Cushman. 1904.
18. Suggestions to importers of food products. 1904.
19. Methods for the detection of renovated butter. 1904.
20. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1904. 1905.
21. Proposed regulations governing the labeling of imported food products. 1901.
22. Cooperative work on the filter test, Association of Official Agricultural Chemists, 1904. 1905.
23. Methods for the examination of maple products. Julius Hortvet. 1905.
24. Analysis of the Mexican plant *Tecoma mollis* H. B. K. L. F. Kebler and A. Seidell. 1905.
25. Coloring matters for foodstuffs and methods for their detection. W. G. Berry. 1905.
26. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1905. 1906.
27. Cooperative work on fats and oils, Association of Official Agricultural Chemists, 1906. L. M. Tolman. 1906.

28. Provisional methods for the determination of food preservatives as authorized by the Association of Official Agricultural Chemists, 1905. 1906.
29. Changes in provisional methods for the analysis of foods and additions thereto, from 1902 to 1905. 1906.
30. Changes in official methods of analysis and additions thereto, 1899 to 1905. 1906.
31. General results of the investigations showing the effect of salicylic acid and salicylates upon digestion and health. H. W. Wiley. 1906.
32. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1906. 1907.
33. Report on methods of beer analysis. H. E. Barnard. 1907.
34. Examination of papers. 1907.
35. Report on colors: The solubility and extraction of colors and the color reactions of dyed fiber and aqueous and sulphuric-acid solutions. H. M. Loomis. 1907.
36. Chemical methods for utilizing wood, including destructive distillation, recovery of turpentine, rosin, and pulp, and the preparation of alcohols and oxalic acid. F. P. Veitch. 1907.
37. General results of the investigations showing the effect of sulphurous acid and sulphites upon digestion and health. 1907.
38. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1907. 1908.
39. General results of the investigation showing the effect of benzoic acid and benzoates upon digestion and health. 1908.
40. Methods for the analysis of maple products and the detection of adulterants, together with the interpretation of the results obtained. A. Hugh Bryan. 1908.
41. Paper-making materials and their conservation. F. P. Veitch. 1908.
42. General results of the investigations showing the effect of formaldehyde upon digestion and health. 1908.
43. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1908. 1909.
44. Apparatus for use in the determination of volatile acids in wines and vinegars. H. C. Gore. 1909.
45. A new method for measuring the electrolytic dissociation of water. C. S. Hudson. 1909.
46. The occurrence of pinene in lemon oil. E. M. Chace. 1909.
47. The hydrolysis of salicin by the enzym emulsion. C. S. Hudson and H. S. Paine. 1909.
48. The cold storage of apple cider. H. C. Gore. 1910.
49. A relation between the chemical constitution and the optical rotary power of the sugar lactones. C. S. Hudson. 1910.
50. The quantitative determination of cane sugar by the use of invertase. C. S. Hudson. 1910.
51. The value of peaches as vinegar stock. H. C. Gore. 1910.
52. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1909. 1910.
53. Suggested modification of the Winton lead number, especially as applied to mixtures of maple and cane sugar sirups. S. H. Ross. 1910.
54. Analyses of canned peas and beans, showing composition of different grades. W. L. Dubois. 1910.
55. The influence of acids and alkalis on the activity of invertase. C. S. Hudson and H. S. Paine. 1910.
56. The determination of total sulphur in organic matter. Herman Schreiber. 1910.
57. Experiments on the preparation of sugared, dried pineapples. H. C. Gore. 1910.
58. The effect of alcohol on invertase. C. S. Hudson and H. S. Paine. 1910.
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60. A theory of the influence of acids and alkalis on the activity of invertase. C. S. Hudson. 1910.
61. How to kill and bleed market poultry. M. E. Pennington and H. M. P. Betts. 1910. Rev. 1915.
62. A comparison of beef and yeast extracts of known origin. F. C. Cook. 1910.
63. Identification of food colors. H. M. Loomis. 1911.
64. Studies of poultry from the farm to the consumer. M. E. Pennington. 1910.
65. The estimation of iodin in organic compounds and its separation from other halogens. A. F. Seeker and W. E. Mathewson. 1910.
66. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1910. 1911.
67. A method for the determinatalon of tin in canned foods. Herman Schreiber and W. C. Taber. 1911.
68. Tomato ketchup under the microscope; with practical suggestions to insure a cleanly product. B. J. Howard. 1911.
69. Improvements in the Knorr fat extraction apparatus. H. L. Walter and C. E. Goodrich. 1911.
70. The comparative rate of decomposition in drawn and undrawn market poultry. M. E. Pennington, Evelyn Witmer, and H. C. Pierce. 1911.
71. Extraction of grains and cattle foods for the determination of sugars; A comparison of the alcohol and the sodium carbonate digestions. A. Hugh Bryan, A. Given, and M. N. Straughn. 1911.
72. An electrically controlled constant temperature water bath for the immersion refractometer. H. C. Gore. 1911.
73. A chemical investigation of the oil of chenopodium. E. K. Nelson. 1911.
74. Detection and determination of small quantities of ethyl and methyl alcohol and of formic acid. Raymond F. Bacon. 1911.
75. Studies on chicken fat: I. The occurrence and permanence of lipase in the fat of the common fowl (*Gallus domesticus*). M. E. Pennington and J. S. Hepburn. II. The oxidation of chicken fat by means of hydrogen peroxid. Joseph S. Hepburn. 1911.
76. Determination of malic acid. P. B. Dunbar and R. F. Bacon. 1911.
77. The determination of camphor. H. C. Fuller. 1911.

78. Changes taking place during the spoilage of tomatoes, with methods for detecting spoilage in tomato products. Raymond F. Bacon and P. B. Dunbar. 1911.
79. Tin salts in canned foods of low acid content, with special reference to canned shrimp. W. D. Bigelow and R. F. Bacon. 1911.
80. Two new pieces of chemical apparatus: I. Apparatus for the continuous extraction of liquids with immiscible solvents lighter than water. II. Apparatus for quantitative reactions which depend on the measurement of an evolved gas. R. F. Bacon and P. B. Dunbar. 1911.
81. The action of drugs under pathological conditions. William Salant. 1911.
82. The unification of reducing sugar methods. (A correction.) Percy H. Walker. 1911.
83. Deterioration of eggs as shown by changes in the moisture content. A. D. Greenlee. 1911.
84. The fluorescent test for mineral and rosin oils. Percy H. Walker and E. W. Boughton. 1911.
85. A modification of the Herzfeld-Bohme method for the detection of mineral oil in other oils. F. P. Veitch and Marion G. Donk. 1912.
86. The refractive index of beeswax. L. Feldstein. 1911.
87. A modification in the determination of malic acid. David S. Pratt. 1911.
88. Determination of citric acid. David S. Pratt. 1912.
89. The quantitative separation of mixtures of certain acid coal tar dyes. W. E. Mathewson. 1912.
90. Extracts from the proceeding of the Association of Official Agricultural Chemists, 1911. 1912.
91. The arsenic content of shellac and the contamination of foods from this source. Bernard H. Smith. 1912.
92. A chemical investigation of American spearmint oil. E. K. Nelson. 1912.
93. Marking porcelain and silica crucibles, etc. P. A. Yoder. 1912.
94. The volatile acidity of gum tragacanth compared with that of Indian gum. W. O. Emery. 1912.
95. A method for the detection of small quantities of coumarin, particularly in factitious vanilla extracts. H. J. Wichmann. 1912.
96. A measurement of the translucency of papers. C. Frank Sammet. 1912.
97. The calcium carbide method for determining moisture. H. C. McNeil. 1912.
98. Practical suggestions for the preparation of frozen and dried eggs. M. E. Pennington. 1912.
99. The estimation of minute amounts of arsenic in foods. Edmund Clark and A. G. Woodman. 1912.
100. Grading rosin at the still. F. P. Veitch and C. F. Sammet. 1912.
101. The ignition of precipitates without the use of the blast lamp. Percy H. Walker and J. B. Wilson. 1912.
102. The determination of arsenic. Claude R. Smith. 1912.
103. Studies on chicken fat: III. Influence of temperature on the lipolysis of esters. IV. The hydrolysis of chicken fat by means of lipase. M. E. Pennington and J. S. Hepburn. V. The occurrence of catalase, oxidases, and reductases in the fat of the common fowl (*Gallus domesticus*). Joseph S. Hepburn. 1912.
104. A study of the enzyms of the egg of the common fowl. M. E. Pennington and H. C. Robertson, jr. 1912.
105. The determination of malic and tartaric acids in the same solution. P. B. Dunbar. 1912.
106. The determination of tartaric acid. P. B. Dunbar. 1912.
107. The detection of faulty sizing in high-grade papers. C. Frank Sammet. 1913.
108. Extracts from the proceedings of the Association of Official Agricultural Chemists, 1912. 1912.
109. A chemical investigation of the composition of the oil of chenopodium. E. K. Nelson. 1913.
110. Identification of tanned skins. C. Frank Sammet. 1913.
111. The effect of certain pigments on linseed oil, with a note on the manganese content of raw linseed oil. E. W. Boughton. 1913.
112. Not published.
113. The quantitative separation and determination of subsidiary dyes in the permitted food colors. Walter E. Mathewson. 1913.
114. The identification of small amounts of dyestuffs by oxidation with bromin. Walter E. Mathewson. 1912.
115. An all-metal poultry-cooling rack. M. E. Pennington and H. C. Pierce. 1913.

FOOD INSPECTION DECISIONS

1. Laws under which the food inspection is conducted. (No date.)
2. Opinions of the Attorney General relating to the scope and meaning of the act of July 1, 1902 (32 Stat. 632), regulating the branding of dairy and food products for interstate commerce. 1903.
3. Notice to exporters of wines. 1904.
4. Suggestions to importers of food products. 1904.
5. Proposed regulations governing the labeling of imported food products. 1904.
6. Style of label required for imported foods. (No date.)
7. Notice to exporters of desiccated fruits. 1904.
8. Notice to importers of liquid egg products. 1904.
9. Notice to importers of dried egg products. 1905.
10. Treasury decision on refunding duties paid on condemned importations of food products. 1905.
11. Suspending regulations governing the labeling of imported sardines and other food substances packed in oil. 1905.
12. Abolishing the rule to admit importations of food products in the case of first notification. 1905.
13. Provisional standards for the limit of sulphurous acid in imported wines. 1905.

14. Analyses of exports must be made before shipment on samples taken from actual cargo. 1905.
15. Placing preservatives in vinegar. 1905.
16. False labeling of vinegar. 1905.
17. Labels attached to wrappers instead of packages; statements relating to wholesomeness of added substance; paster labels. 1905.
18. Statement of quantity of added substance in food products. 1905.
19. False branding of mushrooms. 1905.
20. Statements on labels regarding health laws of other countries. 1905.
21. Relabeling imported food products after arrival in this country. 1905.
22. Illegible or concealed legends on labels. 1905.
23. Labeling of preserves sweetened with cane or beet sugar and glucose. 1905.
24. Adulteration of domestic food products by the addition of preservatives, coloring matters, and other ingredients not natural to foods, not regulated by department. 1905.
25. Food products offered for entry and afterwards declared to be for technical purposes. 1905.
26. Labeling imported food products. 1905.
27. Admission of sardines boiled in peanut oil and packed in olive oil. 1905.
28. Maximum quantity of sulphurous acid in wines. 1905.
29. Coloring matters in synthetic foods. 1905.
30. The use of packages made of tin plate, on which labels have been printed for preserved vegetables, etc., ordered and delivered to manufacturers prior to September 1, 1905. 1905.
31. Labels on detachable wrappers. 1905.
32. Foods entered for the purpose of sale to outgoing ships. 1905.
33. The importation of a beverage under a misleading name. 1906.
34. Preservatives in sausages. 1906.
35. Modifying in certain cases provisions in food inspection decision 12 and food inspection decision 26. 1906.
36. Substances, ordinarily food products, intended for technical purposes. 1906.
37. Labeling of chocolates. 1906.
38. Labeling of cocoas. 1906.
39. Preservatives and artificial colors in macaronis. 1906.
40. Filing guaranty. 1906.
41. Approval of labels. 1906.
42. Mixing flours. 1906.
43. Relabelling of goods on hand. 1906.
44. Scope and purpose of food inspection decisions. 1906.
45. Blended whiskies. 1906.
46. Fictitious firm names. 1906.
47. Flavoring extracts. 1906.
48. Substances used in the preparation of foods. 1906.
49. Time required to reach decisions on different problems connected with the food and drugs act, June 30, 1906. 1907.
50. Imitation coffee. 1907.
51. Coloring of butter and cheese. 1907.
52. Form of label. 1907.
53. Formula on the label of drugs. 1907.
54. Declaration of the quantity or proportion of alcohol present in drug products. 1907.
55. Method of stating quantity or proportion of preparations (containing opium, morphine, etc.) used in manufacturing other preparations. 1907.
56. Names to be employed in declaring the amount of the ingredients as required by the law. 1907.
57. Physicians' prescriptions. 1907.
58. The labelling of products used as foods and drugs as well as for technical and other purposes. 1907.
59. National formulary appendix. 1907.
60. Minor border importations. 1907.
61. Cocoa butter substitutes. 1907.
62. Guaranty on imported products. 1907.
63. Use of the word "compound" in names of drug products. 1907.
64. Labeling of sardines. 1907.
65. The labeling of whisky, blends, compounds, and imitations thereof. 1907.
66. The use of sugar in canned foods. 1907.
67. Polishing and coating rice. 1907.
68. Labeling of food and drug products "manufactured for," "prepared for," "distributed by," etc. 1907.
69. Inspection of food and drugs and identification of inspectors. 1907.
70. Abuse of guaranty for advertising purposes. 1907.
71. Labeling of succotash. 1907.
72. Use of guaranties and serial numbers thereof. 1907.
73. Interstate transportation of imported meats and meat-food products. 1907.
74. Certificates for imported meats and meat-food products of cattle, sheep, swine and goats. 1907.
75. The labeling of mixtures of cane and maple sirups. 1907.
76. Dyes, chemicals, and preservatives in foods. 1907.
77. Certificate and control of dyes permissible for use in coloring foods and foodstuffs. 1907.
78. The use of labels after October 1, 1907. 1907.
79. Collection of samples. 1907.
80. Glazed coffee. 1907.
81. Labelling of caramels. 1907.
82. Labeling of coffee produced in the Dutch East Indies. 1907.
83. The issue of a guaranty based upon a former guaranty. 1907.
84. Amendments to regulations 17 and 19. 1908.
85. Labeling of bitters. 1908.

86. Original packages: Interpretation of regulation 2 of rules and regulations for the enforcement of the food and drugs act. 1908.
87. Labeling of corn sirup. 1908.
88. Private importations. 1908.
89. Amendment to food inspection decision 76, relating to the use in foods of benzoate of soda and sulphur dioxid. 1908.
90. The labeling of foods and medicinal mixtures for stock and poultry. 1908.
91. The labeling of Mocha coffee. 1908.
92. The use of copper salts in the greening of foods. 1908.
93. Amendment to regulation 34. 1908.
94. The labeling of medicinal and table waters. 1908.
95. The use of neutral spirits distilled from beet sugar molasses in the preparation of whisky compounds and imitation whiskies. 1908.
96. Serial number guaranty. 1908.
97. "Soaked curd" cheese. 1908.
98. The labeling of whisky compounds. 1908.
99. Change in form of guaranty legend. 1908.
100. Bleached flour. 1908.
101. Benzoate of soda. 1908.
102. Entry of vegetables greened with copper salts. 1908.
103. The labeling of turpentine. 1909.
104. Amendment to food inspection decisions No. 76 and No. 89, relating to the use in foods of benzoate of soda. 1909.
105. The labeling of canned salmon and whitefish. 1909.
106. Amendment to food inspection decision 77. 1909.
107. Decision of the Attorney General in regard to the legality of the referee board. 1909.
108. Importation of coffee. 1909.
109. The labeling of wines. 1909.
110. Shellfish. 1909.
111. The labeling of yeast. 1910.
112. Amendment to regulation 28 (labeling of derivatives). 1910.
113. The labeling of whisky, mixtures, and imitations thereof, under the food and drugs act of June 30, 1906. 1910.
114. The labeling of "Caracas cocoa." 1910.
115. On the use of geographical names. 1910.
116. Amendment to food inspection decision 74. 1910.
117. The use of certified colors. 1910.
118. Labeling of whisky compounds under food inspection decision 113. 1910.
119. Use of shellac and other gums for coating chocolates and other confections. 1910.
120. Labeling of Ohio and Missouri wines. 1910.
121. The floating of shellfish. 1910.
122. The labeling of port and sherry wines produced in the United States. 1910.
123. Labeling of rices. 1910.
124. Labeling of stock feed. 1910.
125. The labeling of cordials. 1910.
126. Salts of tin in food. 1910.
127. Decision of the Attorney General in regard to the labeling of whiskies sold under distinctive names. 1910.
128. Sago and tapioca. 1910.
129. The certification of straight dyes and mixtures under secondary certificates. (Amendment to food inspection decision 77.) 1910.
130. Amendment to regulation 4. 1911.
131. The composition of evaporated milk. 1911.
132. The use of homogenized butter and skimmed milk in the manufacture of ice cream. 1911.
133. The coloring of green citrus fruits. 1911.
134. The labeling of New Orleans molasses. 1911.
135. Saccharin in food. 1911.
136. Labeling of chocolate and cocoa. 1911.
137. The use of charlock as a substitute for mustard. 1911.
138. Saccharin in food. 1911.
139. Use of the term "sweet oil." 1912.
140. Labeling of vinegars. 1912.
141. The labeling of maraschino and maraschino cherries. 1912.
142. Saccharin in food. 1912.
143. The labeling of candied citron. 1912.
144. Canned foods: Use of water, brine, sirup, sauce, and similar substances in the preparation thereof. 1912.
145. Bleached oats and barley. 1912.
146. On the use of saccharin in foods. 1912.
147. Absinth. 1912.
148. Use of copper salts in the greening of foods. 1912.
149. Use of copper salts in the greening of foods. 1912.
150. Frozen citrus fruit. 1913.
151. Application of regulations. 1913.
152. Brandy. 1913.
153. Amendment to regulation 9, relating to guaranties by wholesalers, jobbers, manufacturers, and other parties residing in the United States to protect dealers from prosecution. 1914.
154. Regulation of marking the quantity of food in package form. 1914.
155. Changing effective date of food inspection decision No. 153, which amends regulation 9, relating to guaranties by wholesalers, jobbers, manufacturers, and other parties residing in the United States, to protect dealers from prosecution. 1914.
156. Wine. 1914.
157. Amending regulation 20, which relates to marking the quantity of food in package form. 1914.
158. Condensed milk, evaporated milk, concentrated milk. 1915.

159. Certification of mixtures containing coal-tar colors. (Amending food inspection decisions 77, 106, and 129.) 1916.
160. Gluten products and "diabetic" food. 1916.
161. Maple products. 1916.
162. Egg noodles and plain noodles. 1916.
163. Amending regulation 29, which related to marking the quantity of food in package form. 1916.
164. Colors in food. 1916.
165. Cacao products. 1916.
166. Rocky Ford melons. (Amending food inspection decision 115.) 1916.
167. Use of guaranty legends and serial numbers on labels and containers printed or marked prior to May 5, 1914. (Amending food inspection decisions 153 and 155.)
168. Amending paragraph (E) of regulation 29, which relates to marking the quantity of food in package form. 1916.
169. Edible vegetable fats and oils. 1917.
170. Sweetened condensed milk, condensed skimmed milk, sweetened condensed skimmed milk, dried milk, dried skimmed milk, and malted milk. 1917.
171. Macaroni, spaghetti, vermicelli, flour macaroni, flour spaghetti, and flour vermicelli. 1917.
172. Condiments other than vinegars and salt. 1918.
173. Canned vegetables, canned peas, and canned pea grades. 1918.
174. Baking powder. 1918.
175. Colors in food. (Amendment to food inspection decisions 76, 117, 129, and 164.) 1918.
176. Evaporated apples. 1918.
177. Soda water flavors and soda, soda water. 1918.
178. Milk and cream. 1919.
179. Amending regulation 29, which relates to marking the quantity of food in package form. 1919.
180. Colors in food. (Amendment to food inspection decisions 76, 117, 164, and 175.) 1919.
181. Cheeses. 1921.
182. Citrus fruits. 1921.
183. Joint regulations of the Department of Agriculture, the Department of Commerce, and the Treasury Department governing procedure on importations of goods subject to the food and drugs act of June 30, 1906. 1922.
184. Colors in food. (Amendment to food inspection decisions 76, 117, 129, 175, and 180.) 1922.
185. Soda water flavors and soda, soda water. 1923.
186. Condiments (other than vinegar and salt). 1923.
187. Edible vegetable oils and fats. 1923.
188. Grain products. 1923.
189. Condensed milk, evaporated milk, concentrated milk. 1923.
190. Butter. 1923.
191. Cacao products. 1923.
192. Mustard and mustard products. 1923.
193. Vinegar. 1924.
194. Marjoram, leaf marjoram. 1924.
195. Cumin seed. 1924.
196. Sauerkraut. 1925.
197. Almond paste and kernel pastes. 1925.

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2. Wheatless rations to flesh young chicks. 1918.
3. How to pick chickens. 1918. (Miscellaneous Circular 42.)
4. How to wrap heads. 1919. Is also Department Circular 52.)

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1912. L. O. Howard.
1913. L. O. Howard.
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1915. L. O. Howard.
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1917. L. O. Howard.
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1919. L. O. Howard.
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1921. L. O. Howard.
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28. Insect enemies of the spruce in the Northeast. A. D. Hopkins. 1901.

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[13] Succeeded Bureau of Statistics and Crop Estimates July 1, 1914. Combined with Bureau of Markets to form Bureau of Markets and Crop Estimates March 3, 1921.
[14] Organized as a division prior to July 1, 1904.
[15] Nos. 27–40 have "New series" after the number. "New series" dropped from title beginning with No. 41.

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34. Principal insects liable to be distributed on nursery stock. Nathan Banks. 1902.
35. Report on codling-moth investigations in the Northwest during 1901. C. B. Simpson. 1902.
36. An index to bulletins Nos. 1–30 (new series) of the Division of Entomology. Nathan Banks. 1902.
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21. Synopsis, catalogue, and bibliography of North American Thysanoptera, with descriptions of new species. Dudley Moulton. 1911.
22. The structure of certain dipterous larvae with particular reference to those in human foods. Nathan Banks. 1912.
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61. Black check in western hemlock. H. E. Burke. 1905.
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73. The plum curculio. Fred Johnson and A. A. Girault. 1906.
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75. Requirements to be complied with by nurserymen or others who make interstate shipments of nursery stock. A. F. Burgess. 1906. Revised 1908; 1909.
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78. The slender seed-corn ground-beetle. F. M. Webster. 1906.
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80. The melon aphis. F. H. Chittenden. 1906.
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82. Pinhole injury to girdled cypress in the South Atlantic and Gulf States. A. D. Hopkins. 1907.
83. The locust borer and methods for its control. A. D. Hopkins. 1907.
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85. The spring grain aphis. F. M. Webster. 1907.
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94. The cause of American foul brood. G. F. White. 1907.
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98. The apple-tree tent caterpillar. A. L. Quaintance. 1908.
99. The nut weevils. F. H. Chittenden. 1908.
100. An index to circulars 1 to 100 of the Bureau of Entomology. Rolla P. Currie and Andrew N. Caudell. 1911.
101. The apple maggot or "railroad worm." A. L. Quaintance. 1908.
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103. The harlequin cabbage bug. F. H. Chittenden. 1908.
104. The common red spider. F. H. Chittenden. 1909.
105. The rose slugs. F. H. Chittenden. 1908.
106. The wheat strawworm. F. M. Webster and George I. Reeves. 1909.
107. What can be done in destroying the cotton-boll weevil during the winter. W. D. Hunter. 1909.
108. House fleas. L. O. Howard. 1909.
109. The leopard moth. L. O. Howard and F. H. Chittenden. 1909.
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113. The chinch bug. F. M. Webster. 1909.
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123. Methods of controlling tobacco insects. A. C. Morgan. 1910.
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139. Damage to sugar cane in Louisiana by the sugar-cane borer. T. C. Barber. 1911.
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164. The gypsy moth as a forest insect, with suggestions as to its control. W. F. Fiske. 1913.
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166. Flour paste as a control for red spiders and as a spreader for contact insecticides. William B. Parker. 1913.
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169. Sacbrood, a disease of bees. G. F. White. 1913.
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1904. Issued in 1905
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1912. Issued in 1913

For later reports see Work and expenditures of the agricultural experiment stations.

[17] From July 1, 1915, to July 1, 1923, this office was under the States Relations Service; from July 1, 1923, to date, under the office of the Secretary.

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1902. A. C. True.
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92. The reservoir system of the Cache la Poudre Valley. E. S. Nettleton. 1901.
93. A report on the work and expenditures of the agricultural experiment stations for the year ended June 30, 1900. 1901.
94. Fourth report on the agricultural investigations in Alaska, 1900. 1901.
95. Report on the agricultural resources and capabilities of Hawaii. William C. Stubbs. 1901.
96. Irrigation laws of the northwest territories of Canada and of Wyoming, with discussions by J. S. Dennis, Fred Bond, and J. M. Wilson. 1901.
97. Statistics of the land-grant colleges and agricultural experiment stations in the United States for the year ended June 30, 1900. 1901.
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157. Water rights on interstate streams: The Platte River and tributaries. Results of investigation. R. P. Teele. Water rights within the States. Elwood Mead. 1905.
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162. Studies on the influence of cooking upon the nutritive value of meats at the University of Illinois, 1903–1904. H. S. Grindley and A. D. Emmett. 1905.
163. Agricultural instruction for adults in continental countries. John Hamilton. 1905.
164. Proceedings of the nineteenth annual convention of the Association of American Agricultural Colleges and Experiment Stations, Washington, D. C., November 14–16, 1905. 1906.
165. Proceedings of the tenth annual meeting of the American Association of Farmers' Institute Workers, Washington, D. C., November 9–11, 1905. 1906.
166. Course in cheese making for movable schools of agriculture. L. L. VanSlyke. 1906.
167. Irrigation in the North Atlantic States. Aug. J. Bowie, jr. 1906.
168. The State engineer and his relation to irrigation. R. P. Teele. 1906.

169. Report on agricultural investigations in Alaska, 1905. C. C. Georgeson. 1906.
170. Report on agricultural investigations in Hawaii, 1905. J. G. Smith. 1906.
171. Report on agricultural investigations in Porto Rico, 1905. D. W. May. 1906.
172. Irrigation in Montana. Samuel Fortier, A. P. Stover, and J. S. Baker. 1906.
173. Corn-harvesting machinery. C. J. Zintheo. 1907.
174. History of farmers' institutes in the United States. John Hamilton. 1906.
175. Experiments on the metabolism of matter and energy in the human body, 1903–1904. F. G. Benedict and R. D. Milner. 1907.
176. Organization lists of the agricultural colleges and experiment stations in the United States. 1907
177. Evaporation losses in irrigation and water requirements of crops. Samuel Fortier. 1907.
178. Course in fruit growing for movable schools of agriculture. Samuel B. Green. 1907.
179. Small reservoirs in Wyoming, Montana, and South Dakota. F. C. Herrmann. 1907.
180. List of publications of the agricultural experiment stations in the United States (to June 30, 1906). 1907.
181. Mechanical tests of pumping plants in California. J. N. Le Conte and C. E. Tait. 1907.
182. Proceedings of the eleventh annual meeting of the American Association of Farmers' Institute Workers, Baton Rogue, La., November 12–14, 1906. 1907.
183. Mechanical tests of pumps and pumping plants used for irrigation and drainage in Louisiana in 1905 and 1906. W. B. Gregory. 1907.
184. Proceedings of the twentieth annual convention of the Association of American Agricultural Colleges and Experiment Stations, Baton Rogue, La., November 14–16, 1906. 1907.
185. Iron in food and its functions in nutrition. H. C. Sherman. 1907.
186. Exercises in elementary agriculture: Plant production. Dick J. Crosby. 1907.
187. Studies on the digestibility and nutritive value of legumes at the University of Tennessee, 1901–1905. Charles E. Wait. 1907.
188. Irrigation in the Yakima Valley, Wash. S. O. Jayne. 1907.
189. Report on the drainage of the eastern parts of Cass, Traill, Grand Forks, Walsh, and Pembina Counties, N. Dak. John T. Stewart. 1907.
190. Irrigation in northern Italy, Part II. Elwood Mead. 1907.
191. Tests of internal-combustion engines on alcohol fuel. Charles Edward Lucke and S. M. Woodward. 1907.
192. Irrigation and drainage laws of Italy. Translated by R. P. Teele. 1907.
193. Studies of the effect of different methods of cooking upon the thoroughness and ease of digestion of meat at the University of Illinois. H. S. Grindley, Timothy Mojonnier, and Horace C. Porter. 1907.
194. A review of investigations in soil bacteriology. Edward B. Voorhees and Jacob G. Lipman. 1907.
195. Simple exercises illustrating some applications of chemistry to agriculture. K. L. Hatch. 1908.
196. Proceedings of the twenty-first annual convention of the Association of American Agricultural Colleges and Experiment Stations, Lansing, Mich., May 28–30, 1907. 1907.
197. Organization lists of the agricultural colleges and experiment stations. 1907. 1907.
198. The prevention of injury by floods in the Neosho Valley, Kans. J. O. Wright. 1908.
199. Proceedings of the twelfth annual meeting of the American Association of Farmers Institute Workers, Washington, D. C., October 23–24, 1907. 1908.
200. Course in cereal foods and their preparation, for movable schools of agriculture. Margaret J. Mitchell. 1908.
201. Cost of pumping from wells for the irrigation of rice in Louisiana and Arkansas. W. B. Gregory. 1908.
202. Digestibility of starch of different sorts as affected by cooking. Edna D. Day. 1908.
203. Distribution of water in the soil in furrow irrigation. R. H. Loughridge. 1908.
204. School gardening and nature study in English rural schools and in London. Susan B. Sipe. 1909.
205. Irrigation in Wyoming. Clarence T. Johnston. 1909.
206. Organization lists of the agricultural colleges and experiment stations in the United States. 1909.
207. Irrigation in the Sacramento Valley, Calif. Samuel Fortier, O. W. Bryant, J. E. Roadhouse, A. E. Wright, and J. H. Barber. 1909.
208. The influence of muscular and mental work on metabolism and the efficiency of the human body as a machine. Francis G. Benedict and Thorne M. Carpenter. 1909.
209. Irrigation in Oregon. John H. Lewis and Percy A. Cupper. 1909.
210. Irrigation in South Dakota. Samuel H. Lea. 1909.
211. Irrigation in Kansas. Don H. Bark. 1909.
212. Proceedings of the twenty-second annual convention of the Association of American Agricultural College and Experiment Stations, Washington, D. C., November 18–20, 1908. 1909.
213. Proceedings of the thirteenth annual meeting of the American Association of Farmers' Institute Workers, Washington, D. C., November 26–27, 1908. 1909.
214. Irrigation in the State of Washington. O. L. Waller. 1909.
215. Irrigation in New Mexico. Vernon L. Sullivan. 1909.
216. Irrigation in Idaho. James Stephenson, Jr. 1909.
217. Drainage of irrigated lands in the San Joaquin Valley, Calif. Samuel Fortier and Victor M. Cone. 1909.
218. Irrigation in Colorado. C. W. Beach and P. J. Preston. 1910.
219. Irrigation in North Dakota. T. R. Atkinson. 1909.
220. Secondary agricultural education in Alabama. C. J. Owens. 1909.
221. Dietary studies in rural regions in Vermont, Tennessee, and Georgia. J. L. Hills, Charles E. Wait, and H. C. White. 1909.
222. Irrigation in Texas. J. C. Nagle. 1910.
223. Dietary studies in public institutions in Philadelphia, Pa. Emma Smedley and R. D. Milner. Dietary studies in public institutions in Baltimore, Md. H. L. Knight, H. A. Pratt, and C. F. Langworthy.

224. Organization lists of the agricultural colleges and experiment stations in the United States. 1910.
225. Proceedings of the fourteenth annual meeting of the American Association of Farmers' Institute Workers, Portland, Oreg., August 16–17, 1909. 1910.
226. Irrigation experiments and investigations in western Oregon. A. P. Stover. 1910.
227. Calcium, magnesium, and phosphorus in food and nutrition. Henry C. Sherman, Arthur J. Mettler, and J. Edwin Sinclair. 1910.
228. Proceedings of the twenty-third annual convention of the Association of American Agricultural Colleges and Experiment Stations, Portland, Oreg., August 18–20, 1909. 1910.
229. Delivery of water to irrigators. Frank Adams. 1910.
230. Report on the St. Francis Valley drainage projects in northeastern Arkansas. Arthur E. Morgan and O. G. Baxter. 1911.
231. College extension in agriculture. Discussions before the graduate school of agriculture, at the Iowa State College, Ames, Iowa, July 4–27, 1910. 1910.
232. Consolidated rural schools and organization of a county system. George W. Knorr. 1910.
233. Organization lists of the agricultural colleges and experiment stations in the United States. 1911.
234. A report upon the reclamation of the overflowed lands in the Marais des Cygnes Valley, Kans. S. H. McCrory, D. L. Yarnell, and W. J. McEathron. 1911.
235. Irrigation in Arizona. R. H. Forbes. 1911.
236. The use of underground water for irrigation at Pomona, Calif. C. E. Tait. 1911. Rev. 1912.
237. Irrigation in California. F. W. Roeding. 1911.
238. Proceedings of the fifteenth annual meeting of the American Association of Farmers' Institute Workers, Washington, D. C., November 14–15, 1910. 1911.
239. Irrigation in the San Joaquin Valley, Calif. Victor M. Cone. 1911.
240. Tidal marshes and their reclamation. George M. Warren. 1911.
241. Legislation relating to farmers' institutes in the United States. John Hamilton. 1911.
242. County schools of agriculture and domestic economy in Wisconsin. A. A. Johnson. 1911.
243. Land drainage by means of pumps. S. M. Woodward. 1911.
244. Report on the Belzoni Drainage District in Washington County, Miss. H. A. Kipp. 1912.
245. Course in the use and preparation of vegetable foods for movable and correspondence schools of agriculture. Anna Barrows. 1912.
246. A report upon the Back swamp and Jacob swamp drainage district, Robeson County, N. C. Samuel H. McCrory and Carl W. Mengel. 1912.
247. Organization lists of the agricultural colleges and experiment stations in the United States. 1912.
248. Evaporation from irrigated soils. Samuel Fortier and S. H. Beckett. 1912.
249. The storage of water for irrigation purposes, Parts I and II. Samuel Fortier and F. L. Bixby. 1912.
250. Arkansas State agricultural schools. C. H. Lane. 1912.
251. Proceedings of the sixteenth annual meeting of the American Association of Farmers' Institute Workers, Columbus, Ohio, November 13–14, 1911. 1912.
252. Some types of children's garden work. Susan B. Sipe. 1912.
253. Organization lists of the agricultural colleges and experiment stations in the United States. 1913.
254. Irrigation resources of California and their utilization. Frank Adams. 1913.
255. Educational contests in agriculture and home economics. George I. Christie. 1913.
256. Proceedings of the seventeenth annual meeting of the American Association of Farmers' Institute Workers, Atlanta, Ga., November 11–13, 1912. 1913.

CIRCULARS

45. Fifth report of committee on methods of teaching agriculture. 1901.
46. The functions and uses of food. C. F. Langworthy. 1901. Revised, 1903; 1904; Jan., 1906; Dec., 1906.
47. The card index of experiment station literature; Outline of the plans of construction. 1902. Revised, 1904; 1907; 1908; 1909.
48. What the Department of Agriculture is doing for irrigation. Elwood Mead. 1902.
49. Secondary courses in agriculture. 1902.
50. Preliminary plans and estimates for drainage of Fresno district, Calif. C. G. Elliott. 1903.
51. List of State directors of farmers' institutes and farmers' institute lecturers of the United States. John Hamilton. 1903. Revised, 1904; 1905; 1906; 1908. third revision, 1906; fourth revision, 1908.
52. A few good books and bulletins on nature study, school gardening, and elementary agriculture for common schools. D. J. Crosby. 1903. Revised 1905.
53. Report of the committee on rural engineering of the Association of American Agricultural Colleges and Experiment Stations. 1903.
54. Report of Committee on Indexing agricultural literature. 1903.
55. The relation of the natural sciences to agriculture in a four-year college course. 1903.
56. Constitution of the Association of American Agricultural Colleges and Experiment Stations, as amended at the seventeenth annual convention of the association, Washington, D. C., November 17–19, 1903. 1903.
57. Supplemental report on drainage in the Fresno district, Calif. C. G. Elliott. 1904.
58. Irrigation in the Valley of Lost River, Idaho. Albert Eugene Wright. 1904.
59. Progress report of cooperative irrigation investigations in California. S. Fortier. 1904.
60. The teaching of agriculture in the rural common schools. 1904.
61. Statistics of land-grant colleges and agricultural experiment stations, 1904. 1905.

62. List of abbreviations employed in Experiment Station Record for titles of periodicals. 1905.
63. The work of the Office of Experiment Stations in irrigation and drainage. 1905.
64. Statistics of land-grant colleges and agricultural experiment stations, 1905. 1906.
65. Irrigation from Snake River, Idaho. H. G. Ruschbacher. 1906.
66. Publications of the Office of Experiment Stations issued during 1905 and station publications received by the Office of Experiment Stations during 1905. 1906.
67. Investigations of irrigation practice in Oregon. A. P. Stover. 1906.
68. Federal legislation, regulations, and rulings affecting agricultural colleges and experiment stations. 1906. Revised, 1908; 1909; revised, 1911, as Office of Experiment Stations Circular 111. Revised, 1912.
69. A four-years' college course in agriculture. 1906.
70. Publications of the Office of Experiment Stations from its organization to June 30, 1906. 1907. Revised, 1907; 1908; 1909.
71. Report of committee on experiment station organization and policy. (Association of American Agricultural Colleges and Experiment Stations.) 1907.
72. Report of committee on extension work. (Association of American Agricultural Colleges and Experiment Stations.) 1907.
73. Country life education. W. M. Hays. 1907.
74. Excavating machinery used for digging ditches and building levees. J. O. Wright. 1907.
75. Report of committee on extension work. 1906–1907. (Association of American Agricultural Colleges and Experiment Stations.) 1907.
76. Swamp and overflowed lands in the United States: Ownership and reclamation. J. O. Wright. 1907.
77. A secondary course in agronomy. 1907. Revised, 1908.
78. Progress report on irrigation experiments in Willamette Valley, Oreg. A. P. Stover. 1908.
79. Form of organization for movable schools of agriculture. John Hamilton. 1908.
80. A report upon the drainage of agricultural lands in the Kankakee River Valley, Ind. 1909.
81. A report upon the drainage of the agricultural lands of Bolivar County, Miss. W. J. McEathron and S. H. McCrory. 1909.
82. Report of committee on station organization and policy. (Association of American Agricultural Colleges and Experiment Stations.) 1908.
83. The American system of agricultural education. A. C. True and Dick J. Crosby. 1909.
84. Education for country life. Willet M. Hays. 1909.
85. Farmers' institutes for women. John Hamilton. 1909.
86. A preliminary report on the St. Francis Valley drainage project in northeastern Arkansas. Arthur E. Morgan. 1909.
87. Organization, work, and publications of irrigation investigations. 1909.
88. Organization, work, and publications of drainage investigations. 1909. Revised, 1910.
89. Organization, work, and publications of food and nutrition investigations. 1909.
90. Normal school instruction in agriculture. M. J. Abbey. 1909.
91. Secondary education in agriculture in the United States. A. C. True. 1909.
92. Progress report on experiments in supplemental irrigation with small water supplies at Cheyenne and Newcastle, Wyo., 1905–1908. O. W. Bryant. 1910.
93. Organization, work and publications of the agricultural education service. 1910.
94. Free publications of the Department of Agriculture classified for the use of teachers. Dick J. Crosby and F. W. Howe. 1910. Revised, 1910.
95. Experiments in supplemental irrigation with small water supplies at Cheyenne, Wyo., in 1909. John H. Gordon. 1910.
96. How to test seed corn in school. F. W. Howe. 1910.
97. Institutions in the United States giving instruction in agriculture. 1910. Revised, 1912.
98. Progress in agricultural education extension. John Hamilton. 1910.
99. Farmers' institutes for young people. John Hamilton and J. M. Stedman. 1910.
100. A secondary course in animal production. H. R. Smith. 1911.
101. The selection and installation of machinery for small pumping plants. W. B. Gregory. 1910.
102. Food and nutrition investigations of the Office of Experiment Stations—organization and publications. 1910.
103. The drainage situation in the lower Rio Grande Valley, Tex. L. L. Hildinger. 1911.
104. A preliminary report on the drainage of the Fifth Louisiana Levee District, comprising the parishes of East Carroll, Madison, Tensas, and Concordia. A. E. Morgan, S. H. McCrory, and L. L. Hildinger. 1911.
105. List of State directors of farmers' institutes and farmers' institute lecturers of the United States. 1910.
106. The American system of agricultural education. A. C. True and Dick J. Crosby. 1911. Revised, 1912.
107. The card index of experiment station literature: Outline of the plant of construction. 1911.
108. Second progress report of cooperative irrigation investigations in California. Frank Adams. 1911.
109. Agricultural fair associations and their utilization in agricultural education and improvement. John Hamilton. 1911.
110. Food customs and diet in American homes. C. F. Langworthy. 1911.
111. Federal legislation, regulations, and rulings affecting agricultural colleges and experiment stations. Revised to March 15, 1911. 1911. It is also a revision of Office of Experiment Stations Circular 68. Revised, 1912.
112. The transportation companies as factors in agricultural extension. John Hamilton. 1911.
113. Drainage of the wet lands of Effingham County, Ga. F. G. Eason. 1911.
114. List of State directors of farmers' institutes and farmers' institute lecturers of the United States. 1911. Revised 1911; 1913.
115. Report of the committee on instruction in agriculture, 1911. 1912.

116. The respiration calorimeter: Application to the study of problems of vegetable physiology. C. F. Langworthy and R. D. Milner. 1912.
117. A working erosion model for schools. Don Carlos Ellis. 1912.
118. The work of the agricultural colleges in training teachers of agriculture for secondary schools. 1913.

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(Numbers not contained here are listed in other series of Office of Experiment Stations publications.)

238. List of publications of the Office of Experiment Stations on the food and nutrition of man. 1901. Revised, 1902; 1903.
358. List of publications of the Office of Experiment Stations on irrigation and drainage. (1900) Revised, 1901; 1902; October 15, 1903; November 15, 1903.
491. Federal legislation, regulations, and rulings affecting agricultural colleges and experiment stations. 1902.
614. General index to the Experiment Station Record, vols. 1–12, 1889–1901, and to Experiment Station Bulletin 2. 1903.
706. The American system of agricultural education. A. C. True and Dick J. Crosby. 1904.
710. Description of exhibits of colleges of agriculture and mechanic arts and experiment stations. Louisiana Purchase Exposition, St. Louis, Mo., 1904. W. H. Beal. 1904.
711. Farmers' institutes in the United States. John Hamilton. 1904.
713. Investigations on the nutrition of man in the United States. C. F. Langworthy and R. D. Milner. 1904.
715. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to June 1, 1904.
719. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to June 1, 1904.
723. Irrigation and drainage investigations. R. P. Teele. 1904.
807. List of publications of the Office of Experiment Stations on agricultural education. Corrected to June 1, 1905. Corrected to August 1, 1905. Corrected to October 1, 1905.
810. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to June 1, 1905.
816. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to June 30, 1905.
820. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to June 28, 1905.
852. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to November 30, 1905.
865. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to March 1, 1906.
875. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to May, 1906.
901. Opinions of the Comptroller of the Treasury on the Adams fund. 1906.
903. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to June 1, 1906.
917. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to November 1, 1906.
933. List of publications of the Office of Experiment Stations on agricultural education. Corrected to November 1, 1906.
938. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to November 1, 1906.
968. Institutions in the United States giving instructions in agriculture. 1907. Reprinted, 1908.
992. List of publications of the Office of Experiment Stations on agricultural education. Corrected to May 1, 1907.
993. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to May 1, 1907.
994. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to May 1, 1907.
1046. List of publications of the Office of Experiment Stations on irrigation and drainage. Corrected to October 1, 1907.
1051. List of publications of the Office of Experiment Stations on agricultural education. Corrected to November 1, 1907.
1052. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to October 15, 1907.
1063. List of publications of the Office of Experiment Stations on the food and nutrition of man. Corrected to December 10, 1907.
1066. Work and publications of drainage investigations. January, 1908.
1076. List of publications of the Office of Experiment Stations on agricultural education. Corrected to February 15, 1908.
1079. Organization, work, and publications of irrigation investigations. 1908.
1094. List of publications of the Office of Experiment Stations on agricultural education. Corrected to June 1, 1908. Corrected to October 1, 1908.
1095. Work and publications of drainage investigations. June 24, 1908.
1179. Constitution and by-laws of the American Association of Farmers' Institute Workers. 1909.
1180. Organization, work, and publications of irrigation investigations. Revised June, 1909.
1184. List of publications of the Office of Experiment Stations on agricultural education. Corrected to July 1, 1909.
1188. Organization, work, and publications of irrigation investigations. Revised May, 1909.
1210. Forestry in nature study. 1909.

FARMERS' INSTITUTE LECTURES

1. Syllabus of illustrated lecture on the care of milk. R. A. Pearson. 1904.
2. Syllabus of illustrated lecture on potato diseases and their treatment. F. C. Stewart and H. J. Eustace. 1904.
3. Syllabus of illustrated lecture on acid soils. H. J. Wheeler. 1904.
4. Syllabus of illustrated lecture on profitable cattle feeding. Frederick B. Mumford. 1905.
5. Syllabus of illustrated lecture on silage and silo construction for the South. Andrew M. Soule. 1905. Revised, 1912.
6. Syllabus of illustrated lecture on essentials of successful field experimentation. C. E. Thorne. 1905.
7. Syllabus of illustrated lecture on roads and road building. 1907.
8. Syllabus of illustrated lecture on farm architecture. Elmina T. Wilson. 1907.
9. Syllabus of illustrated lecture on tobacco growing. J. N. Harper. 1907.
10. Syllabus of illustrated lecture on the production and marketing of eggs and fowls. James Dryden. 1909. Revised, 1910.
11. Syllabus of illustrated lecture on wheat culture. J. I. Schulte. 1910. Revised, 1918.
12. Syllabus of illustrated lecture on farm homes. John Hamilton and George Nox McCain. 1912.
13. Syllabus of illustrated lecture on the peanut: Its culture and uses. W. R. Beattie. 1912.
14. Syllabus of illustrated lecture on farm home grounds—their planting and care. S. W. Fletcher. 1912.
15. Illustrated lecture on the homemade fireless cooker. Mrs. K. C. Davis and Angeline Wood. 1914.
16. Illustrated lecture on swine in the United States. Walter B. Jessee. 1914.

For later issues *see* States Relations Service Syllabuses.

Insular Stations

ALASKA EXPERIMENT STATIONS

ANNUAL REPORTS

1901. C. C. Georgeson. 1902.
1902. C. C. Georgeson. 1903.
1903. C. C. Georgeson. 1904.
1904. C. C. Georgeson. 1905.
1905. C. C. Georgeson. 1906.
1906. C. C. Georgeson, J. W. Neal, Fred E. Rader, and P. H. Ross. 1907.
1907. C. C. Georgeson, R. W. DeArmond, Frederick E. Rader, C. W. Heideman, M. D. Snodgrass, and P. H. Ross. 1908.
1908. C. C. Georgeson, R. W. DeArmond, G. W. Gasser, J. W. Neal, C. W. H. Heideman, and M. D. Snodgrass. 1909.
1909. C. C. Georgeson, R. W. DeArmond, G. W. Gasser, J. W. Neal, and M. D. Snodgrass. 1910.
1910. C. C. Georgeson, G. W. Gasser, J. W. Neal, and M. D. Snodgrass. 1911.
1911. C. C. Georgeson, G. W. Gasser, J. W. Neal, and M. D. Snodgrass. 1912.
1912. C. C. Georgeson, J. W. Neal, G. W. Gasser, and M. D. Snodgrass. 1913.
1913. C. C. Georgeson, J. W. Neal, G. W. Gasser, and M. D. Snodgrass. 1914.
1914. C. C. Georgeson, J. W. Neal, G. W. Gasser, and M. D. Snodgrass. 1915.
1915. C. C. Georgeson, J. W. Neal, G. W. Gasser, and M. D. Snodgrass. 1916.

BULLETINS

1. Suggestions to pioneer farmers in Alaska. C. C. Georgeson. 1902.
2. Vegetable growing in Alaska. C. C. Georgeson. 1905.
3. Haymaking at Kenai Experiment Station. P. H. Ross. 1907.

CIRCULAR

1. Information for prospective settlers in Alaska. C. C. Georgeson. 1916. Revised, 1917; 1923.

GUAM EXPERIMENT STATION

ANNUAL REPORTS

1911. J. B. Thompson and David T. Fullaway. 1912.
1912. J. B. Thompson. 1913.
1913. J. B. Thompson. 1914.
1914. J. B. Thompson and L. B. Barber. 1915.
1915. A. C. Hartenbower, L. B. Barber, and P. Nelson. 1916.

HAWAII EXPERIMENT STATION

ANNUAL REPORTS

1901. Jared G. Smith. 1902.
1902. Jared G. Smith. 1903.
1903. Jared G. Smith. 1904.
1904. Jared G. Smith. 1905.
1905. Jared G. Smith. 1906.
1906. Jared G. Smith, D. L. Van Dine, and J. E. Higgins. 1907.
1907. Jared G. Smith, D. L. Van Dine, J. Edgar Higgins, Alice R. Thompson, and F. G. Krauss. 1908.
1908. E. V. Wilcox, D. L. Van Dine, J. Edgar Higgins, Alice R. Thompson, and F. G. Krauss. 1909.

ANNUAL REPORTS HAWAII EXPERIMENT STATION—continued

1909. E. V. Wilcox, David T. Fullaway, J. E. Higgins, W. P. Kelley, and F. G. Krauss. 1910.
1910. E. V. Wilcox, D. T. Fullaway, J. E. Higgins, W. P. Kelley, and F. G. Krauss. 1911.
1911. E. V. Wilcox, D. T. Fullaway, J. E. Higgins, W. P. Kelley, and C. K. McClelland. 1912.
1912. E. V. Wilcox, D. T. Fullaway, J. Edgar Higgins, Chester J. Hunn, William McGeorge, C. K. McClelland, P. A. Clowes, and W. A. Anderson. 1913.
1913. E. V. Wilcox, David T. Fullaway, J. Edgar Higgins, Chester J. Hunn, W. P. Kelley, C. K. McClelland, C. A. Sahr, and F. A. Clowes. 1914.
1914. E. V. Wilcox, W. P. Kelley, C. J. Hunn, C. K. McClelland, C. A. Sahr, D. T. Fullaway, W. A. Anderson, and F. A. Clowes. 1915.
1915. J. M. Westgate, J. Edgar Higgins, D. T. Fullaway, Wm. T. McGeorge, C. A. Sahr, F. G. Krauss, and F. A. Clowes. 1916.

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1. Chickens and their diseases in Hawaii. T. F. Sedgwick. 1901.
2. The root rot of taro. T. F. Sedgwick. 1902.
3. Insecticides in use in Hawaii. D. L. Van Dine. 1903. Revised, 1904.
4. The cultivation of sisal in Hawaii. F. E. Conter. 1903.
5. A sugar-cane leaf-hopper in Hawaii. D. L. Van Dine. 1904.
6. Mosquitoes in Hawaii. D. L. Van Dine. 1904.
7. The banana in Hawaii. J. E. Higgins. 1904.
8. Methods of milking. F. G. Krauss. 1905.
9. Citrus fruits in Hawaii. J. E. Higgins. 1905.
10. Insect enemies of tobacco in Hawaii. D. L. Van Dine. 1905.
11. The black wattle (*Acacia decurrens*) in Hawaii. J. G. Smith. 1906.
12. The mango in Hawaii. J. E. Higgins. 1906.
13. The composition of some Hawaiian feeding stuffs. E. C. Shorey. 1906.
14. Marketing Hawaiian fruits. J. E. Higgins. 1907.
15. Cultivation of tobacco in Hawaii. J. G. Smith and C. R. Blacow. 1908.
16. The Ceara rubber tree in Hawaii. J. G. Smith and Q. Q. Bradford. 1908.
17. Hawaiian honeys. D. L. Van Dine and Alice R. Thompson. 1908.
18. Insects of cotton in Hawaii. D. T. Fullaway. 1909.
19. Experiments in tapping Ceara rubber trees. E. V. Wilcox. 1910.
20. Shield budding the mango. J. E. Higgins. 1910.
21. A study of the composition of the rice plant. W. P. Kelley and Alice R. Thompson. 1910.
22. Insects attacking the sweet potato in Hawaii. D. T. Fullaway. 1911.
23. Leguminous crops for Hawaii. F. G. Krauss. 1911.
24. The assimilation of nitrogen by rice. W. P. Kelley. 1911.
25. The avocado in Hawaii. J. E. Higgins, C. J. Hunn, and V. S. Holt. 1911.
26. The function and distribution of manganese in plants and soils. W. P. Kelley. 1912.
27. Insects injurious to corn. D. T. Fullaway. 1912.
28. The effect of manganese on pineapple plants, and the ripening of the pineapple fruit. E. V. Wilcox and W. P. Kelley. 1912.
29. Ornamental hibiscus in Hawaii. E. V. Wilcox and V. S. Holt. 1913.
30. The effect of heat on Hawaiian soils. W. P. Kelley and W. T. McGeorge. 1913.
31. Rice soils of Hawaii, their fertilization and management. W. P. Kelley. 1914.
32. The papaya in Hawaii. J. E. Higgins and V. S. Holt. 1914.
33. The organic nitrogen of Hawaiian soils. W. P. Kelley and Alice R. Thompson. 1914.
34. Tobacco insects in Hawaii. D. T. Fullaway. 1914.
35. Absorption of fertilizer salts by Hawaiian soils. W. T. McGeorge. 1914.
36. Grasses and forage plants of Hawaii. C. K. McClelland. 1915.
37. Ammonification and nitrification in Hawaiian soils. W. P. Kelley. 1915.
38. Effect of fertilizers on the physical properties of Hawaiian soils. W. T. McGeorge. 1915.

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A cultura da banana. E. V. Wilcox. 1911. (In Portuguese; also in Hawaiian.)
The grazing industry. E. V. Wilcox. 1911.
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1901. F. D. Gardner. 1902.
1902. F. D. Gardner. 1903.
1903. F. D. Gardner. 1904.
1904. D. W. May. 1905.
1905. D. W. May. 1906.
1906. D. W. May, H. C. Henricksen, W. V. Tower, and J. W. Van Leenhoff. 1907.
1907. D. W. May, Oscar Loew, M. J. Iorns, W. V. Tower, and J. W. Van Leenhoff. 1908.
1908. D. W. May, M. J. Iorns, W. V. Tower, P. L. Gile, J. W. Van Leenhoff, G. L. Fawcett, E. G. Ritzman, and O. Loew. 1909.
1909. D. W. May, Oscar Loew, C. F. Kinman, W. V. Tower, P. L. Gile, J. W. Van Leenhoff, G. L. Fawcett, and E. G. Ritzman. 1910.
1910. D. W. May, Oscar Loew, P. L. Gile, C. F. Kinman, W. V. Tower, G. L. Fawcett, J. W. Van Leenhoff, T. B. McClelland, and E. G. Ritzman. 1911.
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1912. D. W. May, Oscar Loew, P. L. Gile, C. F. Kinman, T. B. McClelland, G. L. Fawcett, G. W. Hooker, and E. G. Ritzman. 1913.

1913. D. W. May, P. L. Gile, C. N. Ageton, T. B. McClelland, G. L. Fawcett, and E. G. Ritzman. 1914.
1914. D. W. May, P. L. Gile, J. O. Carrero, C. F. Kinman, T. B. McClelland, G. L. Fawcett, and R. H. Van Zwaluwenburg. 1915.
1915. D. W. May, P. L. Gile, J. O. Carrero, C. F. Kinman, T. B. McClelland, E. W. Brandes, G. L. Fawcett, and R. H. Van Zwaluwenburg. 1916.

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2. The changa, or mole cricket (*Scapteriscus didactylus* Latr.) in Porto Rico. O. W. Barrett. 1902. Also Spanish edition.
3. Soil survey from Arecibo to Ponce, Porto Rico. C. W. Dorsey, L. Mesmer, and T. A. Caine. 1903. Also Spanish edition.
4. Propagation and marketing of oranges in Porto Rico. H. C. Henricksen. 1904. Also Spanish edition.
5. Tobacco investigations in Porto Rico during 1903–4. J. Van Leenhoff, jr. 1904. Also Spanish edition.
6. The yautias, or tanlers of Porto Rico. O. W. Barrett. 1905. Also Spanish edition.
7. Vegetable growing in Porto Rico. H. C. Henricksen. 1906. Also Spanish edition.
8. Pineapple growing in Porto Rico. H. C. Henricksen and M. J. Iorns. 1909. Also Spanish edition.
9. Sugar cane in Porto Rico. D. W. May. 1910. Also Spanish edition.
10. Insects injurious to citrus fruits and methods for combating them. W. V. Tower. 1911. Also Spanish edition.
11. Relation of calcareous soils to pineapple chlorosis. P. L. Gile. 1911. Also Spanish edition.
12. Lime-magnesia ratio as influenced by concentration. P. L. Gile. 1912.
13. Studies on acid soils of Porto Rico. Oscar Loew. 1913.
14. The red clay soil of Porto Rico. P. L. Gile and C. N. Ageton. 1914.
15. Porto Rican beekeeping. E. F. Phillips. 1914. Also Spanish edition.
16. The effect of strongly calcareous soils on the growth and ash composition of certain plants. P. L. Gile and C. N. Ageton. 1914.
17. Fungus diseases of coffee in Porto Rico. G. L. Fawcett. 1915. Also Spanish edition.
18. Citrus fertilization experiments in Porto Rico. C. F. Kinman. 1915. Also Spanish edition.

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1. Sansevieria. O. W. Barrett. 1903. (In Spanish.)
2. The condition of the coffee industry in Porto Rico. J. W. van Leenhoff. 1904.
3. Sea-island cotton in Porto Rico. R. M. Walker. 1904. Also Spanish edition.
4. Control of the brown ant (*Solenopsis geminata*, Fab.) in orange orchards. O. W. Barrett. 1904. Also Spanish edition.
5. Coffee planting in Porto Rico. J. W. van Leenhoff. 1904. Also Spanish edition.
6. Fertilizers. D. W. May. 1906. Also Spanish edition.
7. Control of the brown ant (*Solenopsis geminata*, Fab.) and the mealybug (*Pseudococcus citri*, Risso) in pineapple plantations. W. V. Tower. 1908.
8. Picking and packing citrus fruits. M. J. Iorns. 1909.
9. The catalase of soils. D. W. May and P. L. Gile. 1909.
10. Some principles in manuring with lime and magnesia. Oscar Loew. 1909.
11. Soil disinfection in agriculture. Oscar Loew. 1909.
12. On the "sick" soils of Porto Rico. Oscar Loew. 1910.
13. Beekeeping in Porto Rico. W. V. Tower. 1911.
14. A study of mosquitoes in San Juan, Porto Rico. W. V. Tower. 1912.
15. Suggestions on coffee planting for Porto Rico. T. B. McClelland. 1912. Also Spanish edition.

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1913. Issued in 1915. 1914. Issued in 1915.

OFFICE OF FARM MANAGEMENT [18]

ANNUAL REPORTS

1916. W. J. Spillman.
1917. W. J. Spillman.
1918. E. H. Thomson.
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1. Suggestions concerning checking and tabulating farm management survey data. 1916.
2. Plan for handling the farm-labor problem. 1917.
3. A method of testing farms in the South for efficiency in management. 1919.

See also Bureau of Agricultural Economics; Markets; Office of Markets.

[18] Name changed to Office of Farm Management and Farm Economics, July 1, 1919.

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ANNUAL REPORTS

1920. H. C. Taylor.

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Livestock record book. (Blank forms.) 1921. (?)
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ANNUAL REPORTS

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1914. C. L. Marlatt.
1915. C. L. Marlatt.
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1917. C. L. Marlatt.
1918. C. L. Marlatt.
1919. C. L. Marlatt.
1920. C. L. Marlatt.
1921. C. L. Marlatt.
1922. C. L. Marlatt.
1923. C. L. Marlatt.
1924. C. L. Marlatt.
1925. C. L. Marlatt.

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Nos. 1–85. January–February, 1915, to October–December, 1925.

UNNUMBERED PUBLICATIONS

Plant quarantine act, August 20, 1912, as amended March 4, 1913, and May 4, 1917. 1917.
Regulations governing the importation of potatoes into the United States. D. F. Houston. 1913.
Order covering admission of foreign potatoes under restriction. David F. Houston. 1914.
Quarantined areas in New York infected with powdery scab. C. L. Marlatt. 1914.
Warning to passengers: Heavy penalty against the movement from the Territory of Hawaii into or through any State, Territory, or district of the United States, other than Hawaii, or certain fruits, nuts, and vegetables. B. T. Galloway. 1914. Also Spanish and Portuguese editions.
Notice of lifting of powdery scab quarantine, effective September 1, 1915. C. L. Marlatt. 1915.
Order restricting admission of cottonseed cake, meal, and all other cottonseed products, except oil, from all foreign countries. 1917.
——— amendment 1. 1925.
Order restricting admission of cottonseed oil from Mexico. 1917.
Rules and regulations governing the importation of cottonseed cake, meal, and other cottonseed products into the United States. D. F. Houston. 1917.
Rules and regulations prohibiting the movement of cotton and cottonseed from Mexico into the United States and governing the entry into the United States of railway cars and other vehicles, freight, express, baggage, or other materials from Mexico at border points. D. F. Houston. 1917.
List of current foreign quarantine and other restrictive orders. 1920. Revised 1922. Title: "Plants and plant products prohibited or restricted entry from foreign countries, including Hawaii and Porto Rico."
Rules and regulations governing (1) Entry for immediate export, (2) Entry for immediate transportation and exportation in bond, and (3) Safeguarding the arrival at a port where entry or landing is not intended of prohibited plants and plant products. E. D. Ball. 1920.
Warning to passengers: Heavy penalty against unauthorized movement from the Republic of Mexico into the United States for any purpose of oranges, sweet limes, grapefruit, mangoes, achras sapotes, peaches, guavas, plums, avocados or alligator pears, seed of the avocado or alligator pear, sugar cane, sweet potatoes and yams, banana plants, nursery stock, plants and seeds, citrus nursery stock, bamboo seed, plants, or cuttings thereof capable of propagation, Irish potatoes, cotton, cottonseed, seed cotton, cottonseed hulls and other cottonseed products, and the stalk and all other parts, whether used for packing or other purposes, in the raw or unmanufactured state, of Indian corn or maize, broomcorn, sweet sorghums, grain sorghums, Sudan grass, Johnson grass, sugar cane, pearl millet, napier grass, teosinte, and Job's tears. E. T. Meredith. 1920.
Notice of lifting of Mexican bean beetle quarantine, effective July 23, 1921. 1921.
Plants and plant products prohibited by restricted entry from foreign countries, including Hawaii and Porto Rico. 1921. Revised 1922.
Regulations pursuant to joint resolutions of House of Representatives and Senate entitled "For the relief of States in the Cotton Belt that have given aid to cotton farmers," approved August 9, 1921. 1922.
——— Amendment 1. Henry C. Wallace. 1924.

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[10] Combined with Bureau of Markets and Crop Estimates to form Bureau of Agricultural Economics, July 1, 1922.

Warning to passengers and crew: Heavy penalty against unauthorized movement from the Territory of Hawaii into or through any State, Territory, or district of the United States, other than Hawaii, of fruits, nuts, and vegetables, and of cotton, cottonseed, and sugar cane. Henry C. Wallace. 1921.
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——— Amendment 1. Henry C. Wallace. 1924.
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ANNUAL REPORTS

1922. F. G. Cottrell.
1923. F. G. Cottrell.
1924. F. G. Cottrell.
1925. Not published.

DIVISION OF FOREIGN MARKETS[20]

ANNUAL REPORTS

1901. Frank H. Hitchcock.
1902. Frank H. Hitchcock.
1903. George K. Holmes.

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22. Our trade with Scandinavia, 1890–1900. Frank H. Hitchcock. 1901.
24. Sources of the agricultural imports of the United States, 1896–1900. Frank H. Hitchcock. 1901.
25. Distribution of the agricultural exports of the United States, 1896–1900. Frank H. Hitchcock. 1901.
26. Agricultural imports of the United Kingdom, 1896–1900. Frank H. Hitchcock. 1902.
27. Our foreign trade in agricultural products, 1892–1901. Frank H. Hitchcock. 1902.
28. Sources of the agricultural imports of the United States, 1897–1901. Frank H. Hitchcock. 1902.
29. Distribution of the agricultural exports of the United States, 1897–1901. Frank H. Hitchcock. 1902.
30. Agricultural imports of Germany, 1897–1901. Frank H. Hitchcock. 1903.
31. Sources of the agricultural imports of the United States, 1898–1902. Frank H. Hitchcock. 1903.
32. Distribution of the agricultural exports of the United States, 1898–1902. Frank H. Hitchcock. 1903.
33. Foreign trade of the United States in forest products, 1902. Frank H. Hitchcock. 1903.
34. Agricultural exports of the United States, 1851–1902. Frank H. Hitchcock. 1903.
35. Foreign import tariffs on meat and meat products, 1903. Frank H. Hitchcock. 1903.
36. Foreign import tariffs on fruits and nuts, 1903. Frank H. Hitchcock. 1903.
37. Foreign import tariffs on grain and grain products, 1903. Frank H. Hitchcock. 1903.

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23. Agricultural imports and exports, 1896–1900. Frank H. Hitchcock. 1901.
24. Agricultural imports and exports, 1897–1901. 1902.
25. Our foreign trade in agricultural products, 1902. 1903.
26. Belgium's foreign trade in agricultural products for 1902. George W. Roosevelt. 1903.

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1901. Gifford Pinchot.
1902. Gifford Pinchot.
1903. Gifford Pinchot.
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1908. Gifford Pinchot.
1909. Gifford Pinchot.
1910. Henry S. Graves.
1911. Henry S. Graves.
1912. Henry S. Graves.
1913. Henry S. Graves.
1914. Henry S. Graves.
1915. Henry S. Graves.
1916. Henry S. Graves.
1917. Albert F. Potter.
1918. Henry S. Graves.
1919. Henry S. Graves.
1920. William B. Greeley.
1921. William B. Greeley.
1922. William B. Greeley.
1923. William B. Greeley.
1924. William B. Greeley.
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30. A forest working plan for township 40, Totten and Crossfield purchase, Hamilton County, New York State forest preserve. Ralph S. Hosmer and Eugene S. Bruce. A discussion of conservative lumbering and the water supply. Frederick H. Newell. 1901.
31. Notes on the red cedar. Charles Mohr. 1901.

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[20] Organized as a section prior to July 1, 1902, and became subsidiary to Bureau of Statistics July 1, 1903.
[21] Organized as a bureau prior to 1905.

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33. The western hemlock. Edward T. Allen. 1902.
34. A history of the lumber industry in the State of New York. William F. Fox. 1902.
35. Eucalypts cultivated in the United States. Alfred James McClatchie. 1902.
36. The woodsman's handbook. Henry Solon Graves. 1902. Revised, 1903. Revised and enlarged. Henry S. Graves and E. A. Ziegler. 1910.
37. The hardy catalpa. William L. Hall and Hermann von Schrenk. 1902.
38. The redwood. Richard T. Fisher, Hermann von Schrenk, and A. D. Hopkins. 1903.
39. Conservative lumbering at Sewanee, Tenn. John Foley. 1903.
40. A new method of turpentine orcharding. Dr. Charles H. Herty. 1903.
41. Seasoning of timber. Hermann von Schrenk and Reynolds Hill. 1903.
42. The woodlot: A handbook for owners of woodlands in southern New England. Henry Solon Graves and Richard Thornton Fisher. 1903.
43. A working plan for forest lands in Hampton and Beaufort Counties, S. C. Thomas H. Sherrard. 1903.
44. The diminished flow of the Rock River in Wisconsin and Illinois, and its relation to the surrounding forests. G. Frederick Schwarz. 1903.
45. The planting of white pine in New England. Harold B. Kempton. 1903.
46. The basket willow. William F. Hubbard. Insects injurious to the basket willow. F. H. Chittenden. 1904.
47. Forest resources of Texas. William L. Bray. 1904.
48. The forests of the Hawaiian Islands. William L. Hall. 1904.
49. The timber of the Edwards plateau of Texas: Its relation to climate, water supply, and soil. William L. Bray. 1904.
50. Crosstie forms and rail fastenings, with special reference to treated timbers. Hermann von Schrenk. 1904.
51. Report on the condition of treated timbers laid in Texas, February, 1902. Hermann von Schrenk. 1904.
52. Forest planting in western Kansas. Royal S. Kellogg. 1904.
53. Chestnut in southern Maryland. Raphael Zon. 1904.
54. The Luquillo Forest Reserve, Porto Rico. John C. Gifford. 1905.
55. Forest conditions of northern New Hampshire. Alfred K. Chittenden. 1905.
56. A working plan for forest lands in Berkeley County, S. C. Charles S. Chapman. 1905.
57. Federal and State forest laws. George W. Woodruff. 1904.
58. The red gum. Alfred K. Chittenden. The mechanical properties of red gum wood. W. Kendrick Hatt. 1905.
59. The maple sugar industry. William F. Fox and William F. Hubbard. The adulterations of maple products. H. W. Wiley. 1905.
60. Report on an examination of a forest tract in western North Carolina. Franklin W. Reed. 1905.
61. Terms used in forestry and logging. 1905.
62. Grazing on the public lands. 1905.
63. The natural replacement of white pine on old fields in New England. S. N. Spring. 1905.
64. Loblolly pine in eastern Texas, with special reference to the production of crossties. Raphael Zon. 1905.
65. Advice for forest planters in Oklahoma and adjacent regions. George L. Clothier. 1905.
66. Forest belts of western Kansas and Nebraska. Royal S. Kellogg. 1905.
67. Forest reserves in Idaho. 1905.
68. A working plan for forest lands in central Alabama. Franklin W. Reed. 1905.
69. Sugar pine and western yellow pine in California. Albert W. Cooper. 1906.
70. Effect of moisture upon the strength and stiffness of wood. Harry Donald Tiemann. 1906.
71. Rules and specifications for the grading of lumber adopted by the various lumber manufacturing associations of the United States. E. R. Hudson. 1906.
72. Wolves in relation to stock, game, and the national forest reserves. Vernon Bailey. 1907.
73. Grades and amount of lumber sawed from yellow poplar, yellow birch, sugar maple, and beech. Edward A. Braniff. 1906.
74. Forest products of the United States: 1905. R. S. Kellogg and H. M. Hale. 1907.
75. California tanbark oak: Part I, Tunbark oak and the tanning industry. Willis Linn Jepson. Part II. Utilization of the wood of tanbark oak. H. S. Betts. Part III. Distribution of tannin in tanbark oak. C. D. Mell. 1911.
76. How to grow and plant conifers in the Northeastern States. C. R. Pettis. 1909.
77. Forest products of the United States: 1906, 1908.
78. Wood preservation in the United States. W. F. Sherfesee. 1909.
79. The life history of lodgepole burn forests. F. E. Clements. 1910.
80. The commercial hickories. Anton T. Boisen and J. A. Newlin. 1910
81. The forests of Alaska. R. S. Kellogg. 1910.
82. Protection of forests from fire. Henry S. Graves. 1910.
83. The forest resources of the world. Raphael Zon. 1910.
84. Preservative treatment of poles. William H. Kempfer. 1911.
85. Chaparral, studies in the dwarf forests, or elfinwood, of southern California. Fred G. Plummer. 1911.
86. Windbreaks: Their influence and value. Carlos G. Bates. 1911.
87. Eucalypts in Florida. Raphael Zon and John M. Briscoe. 1911.
88. Properties and uses of Douglas fir. Part I. Mechanical properties. Part II. Commercial uses. McGarvey Cline and J. B. Knapp. 1911.
89. The Olympic National Forest: Its resources and their management. Findley Burns. 1911.
90. Relation of light chipping to the commercial yield of naval stores. Charles H. Herty. 1911.
91. Grazing and floods: A study of conditions in the Manti National Forest, Utah. Robert V. R. Reynolds. 1911.
92. Light in relation to tree growth. Raphael Zon and Henry S. Graves. 1911.

93. The aspens: Their growth and management. W. G. Weigle and E. H. Frothingham. 1911.
94. Scrub pine. W. D. Sterrett. 1911.
95. Uses of commercial woods of the United States: I. Cedars, cypresses, and sequoias. William L. Hall and Hu Maxwell. 1911.
96. Second-growth hardwoods in Connecticut. Earl H. Frothingham. 1912.
97. Coyote-proof inclosures in connection with range lambing grounds. James T. Jardine. 1911.
98. Reforestation on the national forests. William T. Cox 1911.
99. Uses of commercial woods of the United States: II. Pines. William L. Hall and Hu Maxwell. 1911.
100. The Crater National Forest: Its resources and their conservation. Findley Burns. 1911.
101. Western yellow pine in Arizona and New Mexico. Theodore S. Woolsey, jr. 1911.
102. The identification of important North American oak woods, based on a study of the anatomy of the secondary wood. George B. Sudworth and Clayton D. Mell. 1911.
103. Distinguishing characteristics of North American gumwoods, based on the anatomy of the secondary wood. George B. Sudworth and Clayton D. Mell. 1911.
104. Principles of drying lumber at atmospheric pressure and humidity diagram. Harry D. Tiemann. 1912.
105. Wood turpentines: Their analysis, refining, and composition, based upon experiments at the forest products laboratory at Madison, Wis. L. F. Hawley. 1913.
106. Wood-using industries and national forests of Arkansas. Part I. Uses and supply of wood in Arkansas. J. T. Harris and Hu Maxwell. Part II. Timber resources of the national forests in Arkansas. Francis Kiefer. 1912.
107. The preservation of mine timbers. E. W. Peters. 1912.
108. Tests of structural timbers. McGarvey Cline and A. L. Heim. 1912.
109. Distillation of resinous wood by saturated steam. L. F. Hawley and R. C. Palmer. 1912.
110. The specific heat of wood. Frederick Dunlap. 1912.
111. Lightning in relation to forest fires. Fred G. Plummer. 1912.
112. Fire-killed Douglas fir: A study of its rate of deterioration, usability, and strength. Joseph Burke Knapp. 1912.
113. Methods and apparatus for the prevention and control of forest fires, as exemplified on the Arkansas National Forest. Daniel W Adams. 1912.
114. Forest conditions in Louisiana. J. H. Foster. 1912.
115. Mechanical properties of western hemlock. O. P. M. Goss. 1913.
116. Possibilities of western pines as a source of naval stores. H. S. Betts. 1912.
117. Forest fires: Their causes, extent and effects, with a summary of recorded destruction and loss. Fred G. Plummer. 1912.
118. Prolonging the life of crossties. Howard F. Weiss. 1912.
119. An examination of the oleoresins of some western pines. A. W. Schorger. 1913.
120. Not issued.
121. Forestation of the sand hills of Nebraska and Kansas. Carlos G. Bates and Roy G. Pierce. 1913.
122. Mechanical properties of western larch. O. P. M. Goss. 1913.
123. Bibliography of the pulp and paper industries. Henry E. Surface. 1913.
124. Not issued.
125. The composite type on the Apache National Forest. Harold G. Greenamyre. 1913.
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127. The grinding of spruce for mechanical pulp. J. H. Thickens. 1913.

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25. Forestry and the lumber supply: Forestry and foresters. Theodore Roosevelt. The exhaustion of the lumber supply. R. L. McCormick. The lumberman and the forester. Gifford Pinchot. 1903.
26. Forest fires in the Adirondacks in 1903. H. M. Suter. 1904.
27. Reclamation of flood-damaged lands in the Kansas River Valley by forest planting. George L. Clothier. 1904.
28. Practical assistance to users of forest products. 1904.
29. Exhibit of tree planting on a model prairie farm at the Louisiana Purchase Exposition. 1904.
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31. Exhibit of a forest nursery at the Louisiana Purchase Exposition. 1904.
32. Progress report on the strength of structural timber. W. Kendrick Hatt. 1904.
33. What forestry means to representative men. Portions of addresses delivered at the American Forest Congress, Washington, January 3–6, 1905. 1905.
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35. Forest preservation and national prosperity. Portions of addresses delivered at the American Forest Congress, January 2–6, 1905, by President Roosevelt, Ambassador Jusserand, Secretary Wilson, and others. 1905.
36. The Forest Service: What it is and how it deals with forest problems. 1905.
37. Forest planting in the sand-hill region of Nebraska. Species suitable for planting. 1906.
38. Instructions to engineers of timber tests. W. Kendrick Hatt. 1906. Revised 1909.
39. Experiments on the strength of treated timber. W. Kendrick Hatt. 1906.
40. The utilization of tupelo. H. B. Holroyd. 1906
41. Forest planting on coal lands in western Pennsylvania. S. N. Spring. 1906.
42. Consumption of tanbark in 1905. H. M. Hale. 1906.
43. Crossties purchased by the steam railroads of the United States in 1905. H. M. Hale. 1906.

44. Wood used for pulp in 1905. H. M. Hale. 1906.
45. Forest planting in eastern Nebraska. Frank G. Miller. 1906.
46. Holding force of railroad spikes in wooden ties. W. Kendrick Hatt. 1906.
47. Strength of packing boxes of various woods. W. Kendrick Hatt. 1906.
48. Kiln-drying hardwood lumber. Frederick Dunlap. 1906.
49. Timber used in the mines of the United States in 1905. R. S. Kellogg. 1906.
50. Wood used for distillation in 1905. H. M. Hale. 1906.
51. Wood used for veneer in 1905. H. M. Hale. 1906.
52. The lumber cut of the United States in 1905. S. R. Kellogg. 1906.
53. Wood used for tight cooperage stock in 1905. H. M. Hale. 1907.
54. How to cultivate and care for forest plantations on the semiarid plains. 1907.
55. How to pack and ship young forest trees. 1907.
56. Bur oak. 1907. Revised 1910.
57. Jack pine. 1907.
58. Red oak. 1907. Revised 1909; 1911.
59. Eucalypts. 1907.
60. Red pine. 1907.
61. How to transplant forest trees. 1907.
62. Shagbark hickory. 1907.
63. Basswood. 1907. Revised 1909.
64. Black locust. 1907.
65. Norway spruce. 1907.
66. White elm. 1907.
67. White pine. 1907.
68. Scotch pine. 1907.
69. Fence-post trees. 1907.
70. European larch. 1907. Revised 1909.
71. Chestnut. 1907.
72. Western yellow pine. 1907.
73. Red cedar. 1907.
74. Honey locust. 1907.
75. Hackberry. 1907.
76. Silver maple. 1907
77. Cottonwood. 1907.
78. Woods used for packing boxes in New England. J. P. Wentling. 1907.
79. The control of forest fires at McCloud, Calif. A. W. Cooper and P. D. Kelleter. 1907.
80. The fractional distillation of coal-tar creosote. Arthur L. Dean and Ernest Bateman. 1907.
81. Forest planting in Illinois. R. S. Kellogg. 1907. Revised, 1910.
82. Hardy catalpa. 1907.
83. Russian mulberry. 1907.
84. White ash. 1907.
85. Slippery elm. 1907.
86. Box elder. 1907. Revised, 1909.
87. White willow. 1907.
88. Black walnut. 1907. Revised, 1909.
89. Tamarack. 1907. Revised, 1909.
90. Osage orange. 1907.
91. Coffeetree. 1907.
92. Green ash. 1907.
93. Yellow poplar. 1907. Revised, 1910.
94. Black cherry. 1907.
95. Sugar maple. 1907.
96. Arbor Day. 1907.
97. The timber supply of the United States. R. S. Kellogg. 1907.
98. Quantity and character of creosote in well-preserved timbers. Gellert Alleman. 1907.
99. Suggestions for forest planting on the semiarid plains. 1907.
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MAP FOLDERS

Map of Chelan National Forest and directions to hunters and campers. 1913.
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Map of Sierra National Forest and directions to tourists and campers. 1915.
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Misc. F–2. Water-power projects and telephone, telegraph, and power transmission lines on the national forests. 1913.
Misc. F–6. Our timber supply. 1916.

MISCELLANEOUS G

Misc. G–1. Suggestions for collection of range plant specimens on national forests. 1915.

MISCELLANEOUS L

Misc. L–1. Suggestions and information to prospective forest homestead applicants. 1915.
Misc. L–3. National forests by districts. 1915. Revised 1917; 1919.
Misc. L–4. Homesteads in the national forests. 1917.

MISCELLANEOUS O

Misc. O–3. Telephone construction and maintenance on the national forests. Instructions to forest officers. 1915.
Misc. O–6. Trail construction on the national forests. 1915.
Misc. O–8. Camp-fire instructions. 1915.
Misc. O–9. Information regarding employment on the national forests. 1916. Revised, 1919; 1921; 1925.
Misc. O–11. Area table. 1916.

MISCELLANEOUS R

Misc. R–3. Use but do not abuse farm woodlands. 1918.

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30. State forestry laws. Pennsylvania. Jeannie S. Peyton. 1921. (Forestry laws leaflet 26.)

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1. Alpine fir. 1907.
2. Port Orford cedar. 1907.
3. Engelmann spruce. 1907.
4. White fir. 1907.
5. Lowland fir. 1907.
6. Sitka spruce. 1907.
7. Noble fir. 1907.
8. Red fir. 1907.
9. Incense cedar. 1907.
10. Bigcone spruce. 1907.
11. Giant arborvitae. 1907.
12. Yellow cedar. 1907.
13. Western white pine. 1907.
14. Western larch. 1907.
15. White spruce. 1908.
16. Single-leaf piñon. 1908.
17. Four-leaf piñon. 1908.
18. Redwood. 1908.
19. Bigtree. 1908.
20. Weeping spruce. 1908.
21. Jeffrey pine. 1908.
22. Amabilis fir. 1908.
23. Bristle-cone pine. 1908.
24. Bristle-cone fir. 1908.
25. Cottonwood. 1908.
26. Foxtail pine. 1908.
27. Torrey pine. 1908.
28. Black spruce. 1908.
29. Blue spruce. 1908.
30. California swamp pine. 1908.
31. Black hemlock. 1908.
32. Tamarack. 1908.
33. Digger pine. 1908.
34. Coulter pine. 1908.
35. Alpine larch. 1908.
36. Knobcone pine. 1908.
37. White-bark pine. 1908.
38. Paper birch. 1908.
39. Monterey pine. 1908.
40. Swamp cottonwood. 1908.
41. Chestnut oak. 1908.
42. Sugar maple. 1908.
43. Red or Norway pine. 1909.
44. Jack pine. 1909.
45. Western hemlock. 1912.
46. Limber pine. 1909.
47. Piñon pine. 1909.
48. Pignut hickory. 1909.
49. Shagbark hickory. 1909.
50. Big shellbark; king-nut hickory. 1909.
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BUREAU OF MARKETS AND CROP ESTIMATES[24]

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See also Bureau of Agricultural Economics; Office of Farm Management; Markets.

OFFICE OF MARKETS[25]

ANNUAL REPORT

1914. Charles J. Brand.

See also Bureau of Agricultural Economics; Markets; Office of Farm Management.

OFFICE OF MARKETS AND RURAL ORGANIZATION[26]

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1915. Charles J. Brand.
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[24] Combined with Office of Farm Management and Farm Economics to form Bureau of Agricultural Economics July 1, 1922.
[25] Name changed to Office of Markets and Rural Organization July 1, 1914.
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5. Seeds and plants imported. Inventory No. 9; Nos. 4351–5500. 1902.
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50. Wild rice: Its uses and propagation. Edgar Brown and Carl S. Scofield. 1903.
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70. The commercial status of durum wheat. Mark Alfred Carleton and Joseph S. Chamberlain. 1904.
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93. The control of apple bitter-rot. W. M. Scott. 1906.
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99. A quick method for the determination of moisture in grain. Edgar Brown and J. W. T. Duvel. 1907.
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103. Dry farming in the Great Basin. Carl S. Scofield. 1907.
104. The use of feldspathic rocks as fertilizers. Allerton S. Cushman. 1907.
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133. Peach, apricot, and prune kernels as by-products of the fruit industry of the United States. Frank Rabak. 1908.
134. The influence of a mixture of soluble salts, principally sodium chlorid, upon the leaf structure and transpiration of wheat, oats, and barley. L. L. Harter. 1908.
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144. Apple blotch, a serious disease of southern orchards. W. M. Scott and James B. Rorer. 1909.
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149. Diseases of deciduous forest trees. Hermann von Schrenk and Perley Spaulding. 1909.
150. The wild alfalfas and clovers of Siberia, with a perspective view of the alfalfas of the world. N. E. Hansen. 1909.
151. Fruits recommended by the American Pomological Society for cultivation in the various sections of United States and Canada. Revised by a committee of the American Pomological Society, W. H. Ragan, chairman. 1909.
152. The loose smuts of barley and wheat. E. M. Freeman and Edward C. Johnson. 1909.

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154. Farm water supplies of Minnesota. Karl F. Kellerman and H. A. Whittaker. 1909.
155. The control of black-rot of the grape. C. L. Shear, George F. Miles, and Lon A. Hawkins. 1909.
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157. The Truckee-Carson Experiment Farm. Carl S. Scofield and Shober J. Rogers. 1909.
158. The root-rot of tobacco caused by *Thielavia basicola*. W. W. Gilbert. 1909.
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161. A new type of Indian corn from China. G. N. Collins. 1909.
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163. Varieties of American upland cotton. Frederick J. Tyler. 1910.
164. Promising root crops for the South. I. Yautías, taros, and dasheens. O. W. Barrett. II. Agricultural history and utility of the cultivated aroids. O. F. Cook. 1910.
165. Application of some of the principles of heredity to plant breeding. W. J. Spillman. 1909.
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177. A protected stock range in Arizona. David Griffiths. 1910.
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188. Dry farming in relation to rainfall and evaporation. Lyman J. Briggs and J. O. Belz. 1910.
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192. Drought resistance of the olive in the Southwestern States. Silas C. Mason. 1911.
193. Experiments in blueberry culture. Frederick V. Coville. 1910.
194. Summer apples in the Middle Atlantic States. H. P. Gould. 1911.
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203. The importance and improvement of the grain sorghums. Carleton R. Ball. 1911.
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206. The blister rust of white pine. Perley Spaulding. 1911.
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3. Some stem tumors or knots on apple and quince trees. George G. Hedgcock. 1908.
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130. Miscellaneous papers: A. Cotton problems in Louisiana. O. F. Cook. B. The use of Congo red in culture media. Karl F. Kellerman. C. A simple and economical method of burning lime. J. H. Arnold and John E. Nichols. 1913.
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OFFICE OF COTTON, TRUCK, AND FORAGE CROP DISEASE INVESTIGATIONS

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1. Powdery dry rot of potato. W. A. Orton and G. K. K. Link. 1918.
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5. Growing high-grade potato seed stock. H. A. Edson and William Stuart. 1918.
6. Wart of potatoes: A disease new to the United States. L. O. Kunkel. 1919.
7. Washington asparagus: Information and suggestions for growers of new pedigreed rust-resistant strains. J. B. Norton. 1919.

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1. The pistache nut. W. T. Swingle. 1916.
2. A lister attachment for a cotton planter. Stephen H. Hastings. 1917.
3. Growing Bermuda onion seed in the southwestern United States. S. C. Mason. 1917.
4. Tangelos: What they are. The value in Florida of the Sampson and Thornton tangelos. W. T. Swingle and T. R. Robinson. 1918.
5. Varieties of the Satsuma orange group in Japan. Tyozaburo Tanaka. 1918.

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CIRCULARS

1. Establishing the swine industry on the North Platte Reclamation Project. Charles S. Jones and F. D. Farrell. 1915.
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140. The school garden. L. C. Corbett. 1905.
177. A variety collection of gladiolus. A. J. Pieters. 1905.
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281. Cooperative experiments with forage crops. Autumn of 1907–spring of 1908. 1907.
290. Model plan for a southern farm. 1907.
330. Bean anthracnose. 1907.
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332. The citrange: A new citrus fruit. 1907.
333. The Colman citrange. 1907.
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452. Hints to settlers on the Minidoka project, Idaho. Alex. McPherson. 1909.
453. Hints to settlers on the Belle Fourche project, South Dakota. C. A. Jensen. 1909.
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455. Hints to settlers on the Williston project, North Dakota. J. C. McDowell. 1909.
457. Agricultural conditions in southern Texas. 1909.
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485. Farm notes: The corn crop. S. A. Knapp. 1909.
485. (b) The selection of cotton and corn seed for southern farms. S. A. Knapp. 1909.
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629. The burning quality of tobacco, with suggestions for its improvement in the flue-cured types of eastern North Carolina and South Carolina. E. H. Mathewson. 1910.
631. Farm fertilizers. S. A. Knapp. January, 1911.
631. (Revised?) Canning. Mary E. Creswell and Ola Powell. 1915.
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633. Distribution of cottonseed in 1911. 1911.
644. Boys' demonstration work: The corn clubs. S. A. Knapp and O. B. Martin. 1911. Revised 1912. Bradford Knapp and O. B. Martin. Revised 1913. Bradford Knapp and O. B. Martin.
647. Results of boys' demonstration work in corn clubs in 1910. S. A. Knapp and O. B. Martin. 1911.
648. The control of cotton wilt and root-knot. W. A. Orton. 1911.
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720. Memorandum of information concerning official cotton grades. N. A. Cobb. 1912.
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813. Distribution of cottonseed in 1913. 1913.
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883. Tomato growing as club work in the North and West. L. C. Corbett. 1913.
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1110. The dasheen, a root crop for the South. Robert A. Young. 1914.
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CIRCULARS

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2. Cooperative shelter-belt development on the Northern Great Plains. 1916.
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4. Care of cooperative shelter belts on the Northern Great Plains. 1919.
5. Conifer additions to shelter belts on the Northern Great Plains. 1919.
6. Instructions for the planting and care of conifer trees in cooperative shelter belts. 1919.
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OFFICE OF ECONOMIC AND SYSTEMATIC BOTANY

CIRCULAR

1. Directions for the preparation of plant specimens for identification. S. F. Blake. 1919.

FARMERS' COOPERATIVE DEMONSTRATION WORK IN THE SOUTH

CIRCULAR

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OFFICE OF FOREIGN SEED AND PLANT INTRODUCTION

CIRCULARS

1. New plant introductions: Descriptions of imported seeds and plants which will be sent to experimenters. Sixth annual list 1916–1917. 1917.
2. Recipes for the preparation of the dasheen. 1916.
3. New plant introductions: Descriptions of imported seeds and plants which will be sent to experimenters. Seventh annual list 1917–1918. 1917.

INVENTORIES OF SEEDS AND PLANTS IMPORTED

These inventories list seeds and plants sought throughout the world by agents of the department and introduced by them into this country: Nos. 9–30 were issued as Bureau of Plant Industry Bulletins 5, 66, 97, 106, 132, 137, 142, 148, 153, 162, 168, 175, 205, 207, 208, 223, 227, 233, 242, 248, 261, 282. Subsequent inventories have been issued not as bulletins but with inventory number only. No. 74 covering the period January 1 to March 31, 1923, was the last number issued prior to December 31, 1925.

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The chayote. A new winter vegetable from the South. David Fairchild. 1908.
How to send living plant material to America. David Fairchild. 1914.
The forcing and blanching of dasheen shoots. Robert A. Young. 1914.
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Cultural requirements of the dasheen for the southern United States, from southeastern Texas to eastern South Carolina. 1921.
The dasheen: Recipes for plain cooking. 1921.
The chayote: A valuable new southern vegetable. 1923.
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OFFICE OF HORTICULTURAL AND POMOLOGICAL INVESTIGATIONS

CIRCULAR

1. Varieties of the Satsuma orange group in the United States. L. B. Scott. 1918.

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CIRCULAR

1. Crop plants for paper making. Charles J. Brand. 1916. (Reprint of B. P. I. Cir.[37] 82.)

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[37] B. P. I. Cir.=Bureau of Plant Industry Circular.

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25. Proceedings of the Jefferson Memorial and interstate good roads convention, Charlottesville, Va., April 2–4, 1902. 1902.
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[29] Became part of Bureau of Plant Industry July 1, 1901.

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37. Soils of the eastern United States and their use—XV. The Clyde loam. Jay A. Bonsteel. 1911.
38. Soils of the eastern United States and their use—XVI. The Dekalb silt loam. Jay A. Bonsteel. 1911.
39. Soils of the eastern United States and their use—XVII. The Porters loam and Porters black loam. Jay A. Bonsteel. 1911.
40. Soils of the eastern United States and their use—XVIII. The Wabash silt loam. Jay A. Bonsteel. 1911.
41. Soils of the eastern United States and their use—XIX. The Wabash clay. Jay A. Bonsteel. 1911.
42. Soils of the eastern United States and their use—XX. The Trinity clay. Jay A. Bonsteel. 1911.
43. The selection of land for general farming in the Gulf Coast region east of the Mississippi River. W. E. Tharp. 1911.
44. Soils of the eastern United States and their use—XXI. The Norfolk sand. Jay A. Bonsteel. 1911.
45. Soils of the eastern United States and their use—XXII. The Norfolk sandy loam. Jay A. Bonsteel. 1911.
46. Soils of the eastern United States and their use—XXIII. The Orangeburg fine sandy loam. Jay A. Bonsteel. 1911.
47. Soils of the eastern United States and their use—XXIV. The Orangeburg sandy loam. Jay A. Bonsteel. 1911.
48. Soils of the eastern United States and their use—XXV. The Orangeburg fine sand. Jay A. Bonsteel. 1911.
49. Soils of the eastern United States and their use—XXVI. The Houston clay. Jay A. Bonsteel. 1911.
50. Soils of the eastern United States and their use—XXVII. The Houston black clay. Jay A. Bonsteel. 1912.
51. Soils of the eastern United States and their use—XXVIII. The Susquehanna fine sandy loam. Jay A. Bonsteel. 1912.
52. Soils of the San Luis Valley, Colo. Macy Lapham. 1912.
53. Soils of the Shenandoah River terrace: A revision of certain soils in the Albermarle area of Virginia. Hugh H. Bennett. 1912.
54. Soils of the eastern United States and their use—XXIX. The Crowley silt loam. Jay A. Bonsteel. 1912.
55. Soils of the eastern United States and their use—XXX. The Chester loam. Jay A. Bonsteel. 1912.
56. Soils of the eastern United States and their use—XXXI. The Penn loam. Jay A. Bonsteel. 1912.
57. Soils of the eastern United States and their use—XXXII. The Carrington silt loam. Jay A. Bonsteel. 1912.
58. Soils of the eastern United States and their use—XXXIII. The Carrington clay loam. J. A. Bonsteel. 1912.
59. Soils of the eastern United States and their use—XXXIV. The Marion silt loam. Jay A. Bonsteel. 1912.
60. Soils of the eastern United States and their use—XXXV. The Volusia loam. Jay A. Bonsteel. 1912.
61. An investigation of the Otero Basin, N. Mex., for potash salts. E. E. Free. 1912.
62. Report of a reconnoissance of the Lyon nitrate prospect near Queen, N. Mex. E. E. Free. 1912.
63. Soils of the eastern United States and their use—XXXVI. The Volusia silt loam. Jay A. Bonsteel. 1912.
64. Soils of the eastern United States and their use—XXXVII. The Hagerstown clay. Jay A. Bonsteel. 1912.

65. Soils of the eastern United States and their use—XXXVIII. Muck and peat. Jay A. Bonsteel. 1912.
66. City street sweepings as a fertilizer. J. J. Skinner and J. H. Beattie. 1912.
67. Sponge spicules in swamp soils. R. O. E. Davis. 1912.
68. Soils of the eastern United States and their use—XXXIX. Meadow. Jay A. Bonsteel. 1912.
69. Soils of the eastern United States and their use—XL. Marsh and swamp. Jay A. Bonsteel. 1912.
70. Alunite as a source of potash. W. H. Waggaman. 1912.
71. The extraction of potash from silicate rocks. William H. Ross. 1912.
72. Soil survey of Payne Prairie, Gainsville area, Fla. Charles N. Mooney. 1912.
73. Nitrate prospects in the Amargosa Valley, near Tecopa, Calif. E. E. Free. 1912.
74. The organic constituents of soils. Oswald Schreiner. 1913.
75. Manganese as a fertilizer. M. X. Sullivan and W. O. Robinson. 1913.
76. Alunite and kelp as potash fertilizers. J. J. Skinner and A. M. Jackson. 1913.
77. Not published.
78. Not published.
79. Soils of the Sutter Basin: A revision in the survey of certain soils in the Marysville area, Calif. 1913.

FIELD OPERATIONS

1900. (Second report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1901.
1901. (Third report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1902.
1902. (Fourth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1903.
1903. (Fifth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1904.
1904. (Sixth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1905.
1905. (Seventh report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1907.
1906. (Eighth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1908.
1907. (Ninth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1909.
1908. (Tenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1911.
1909. (Eleventh report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1912.
1910. (Twelfth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1912.
1911. (Thirteenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1914.
1912. (Fourteenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1915.
1913. (Fifteenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1916.
1914. (Sixteenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1919.
1915. (Seventeenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1919.
1916. (Eighteenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1921.
1917. (Nineteenth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1923.
1918. (Twentieth report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1924.
1919. (Twenty-first report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1925.
1920. (Twenty-second report) Milton Whitney. Accompanying papers by assistants in charge of field parties. 1925.

SOIL SURVEYS [82]

ALASKA

1914. Soil reconnoissance in Alaska, with an estimate of the agricultural possibilities. 1915.
1916. Report on a reconnoissance of the soils, agriculture, and other resources of the Kenai Peninsula region of Alaska. 1918.

ALABAMA

1908. Autauga County. 1910.
1909. Baldwin County. 1911.
1914. Barbour County. 1916.
1908. Bibb County. 1910.
1905. Blount County. 1906.
1913. Bullock County. 1915.
1907. Butler County. 1909.
1908. Calhoun County. 1910.
1909. Chambers County. 1911.
1903. Cherokee County. (See Fort Payne area.)
1911. Chilton County. 1913.
1921. Choctaw County. 1925.
1912. Clarke County. 1913.
1915. Clay County. 1916.
1913. Cleburne County. 1915.
1909. Coffee County. 1911.
1908. Colbert County. 1909.

[82] The date preceding the title refers to the year in which the survey was made.

ALABAMA—continued

1912. Conecuh County. 1914.
1912. Covington County. 1914.
1921. Crenshaw County. 1924.
1908. Cullman County. 1910.
1910. Dale County. 1911.
1905. Dallas County. 1905.
1903. Dekalb County. (See Fort Payne Area.)
1911. Elmore County. 1913.
1913. Escambal County. 1915.
1908. Etowah County. 1910.
1917. Fayette County. 1920.
1903. Fort Payne Area (parts of Dekalb and Cherokee Counties). 1904.
1920. Geneva County. 1924.
1909. Hale County. 1910.
1908. Henry County. 1909.
1920. Houston County. 1923.
1903. Huntsville Area (parts of Limestone and Madison Counties). 1904.
1911. Jackson County. 1912.
1908. Jefferson County. 1910.
1908. Lamar County. 1909.
1905. Lauderdale County. 1905.
1914. Lawrence County. 1916.
1906. Lee County. 1907.
1914. Limestone County (see also Huntsville Area). 1916.
1916. Lowndes County. 1918.
1904. Macon County. 1905.
1911. Madison County (see also Huntsville Area). 1913.
1920. Margeno County. 1923.
1907. Marion County. 1908.
1911. Marshall County. 1913.
1903. Mobile area (part of Mobile County). 1904.
1911. Mobile County. 1912.
1916. Monroe County. 1918.
1905. Montgomery County. 1906.
1918. Morgan County. 1921.
1902. Perry County. 1903.
1916. Pickens County. 1917.
1910. Pike County. 1911.
1911. Randolph County. 1912.
1913. Russell County. 1915.
1917. Shelby County. 1920.
1917. St. Clair County. 1920.
1904. Sumter County. 1905.
1907. Talladega County. 1908.
1909. Talmpoosa County. 1910.
1911. Tuscaloosa County. 1912.
1915. Walker County. 1916.
1915. Washington County. 1917.
1916. Wilcox County. 1918.

ARIZONA

1921. Benson area (part of Cochise County). 1924.
1921. Cochise County (see Benson and San Simon area).
1921. Coconimo County (see Winslow area).
1903. Graham County (see Solomonsville area).
1917. Maricopa County (see Middle Gila Valley and Salt River Valley areas).
1917. Middle Gila Valley area (parts of Maricopa and Pinal Counties). 1920.
1921. Navajo County (see Winslow area).
1917. Pinal County (see Middle Gila Valley area).
1900. Salt River Valley (part of Maricopa County). 1902.
1921. San Simon area (part of Cochise County). 1924.
1903. Solomonsville area (part of Graham County). 1904.
1921. Winslow area (parts of Coconimo and Navajo Counties). 1924.
1902. Yuma area (part of Yuma County). 1903.
1904. Yuma area (parts of Yuma County, Ariz., and Imperial County, Calif.). 1905.
1905. Yuma County (see Yuma area).

ARKANSAS

1902. Arkansas County (see Stuttgart area).
1913. Ashley County. 1914.
1906. Benton County (see Fayetteville area).
1914. Columbia County. 1916.
1907. Conway County. 1908.
1916. Craighead County. 1917.
1917. Drew County. 1919.
1917. Faulkner County. 1919.
1906. Fayetteville area (parts of Benton and Washington Counties). 1907.
1916. Hempstead County. 1917.
1917. Howard County. 1919.
1915. Jefferson County. 1916.
1921. Lonoke County. 1925.
1903. Miller County. 1904.
1914. Mississippi County. 1916.
1920. Perry County. 1923.
1913. Pope County. 1915.
1906. Prairie County. 1907.
1902. Stuttgart area (part of Arkansas County). 1903.
1906. Washington County (see Fayetteville area).
1915. Yell County. 1917.

Reconnaissance

1911. Ozark region, Arkansas and Missouri (Baxter, Benton, Boone, Carroll, Cleburne, Conway, Crawford, Faulkner, Fulton, Izard, Johnson, Madison, Marion, Newton, Pope, Searcy, Sharp, Stone, Van Buren, and Washington Counties, and part of Franklin, Independent, Lawrence, Lonoke, Pulaski, Randolph, and White Counties, Ark.; and Barry, Benton, Camden, Carter, Christian, Cole, Crawford, Dade, Dallas, Dent, Douglas, Franklin, Gasconade, Greene, Hickory, Howell, Iron, Jefferson, Laclede, Lawrence, McDonald, Madison, Maries, Miller, Moniteau, Morgan, Newton, Oregon, Osage, Ozark, Perry, Phelps, Polk, Pulaski, Reynolds, Ste. Genevieve, St. Francois, Shannon, Stone, Taney, Texas, Washington, Wayne, Webster, and Wright Counties, and parts of Barton, Bollinger, Butler, Cape Girardeau, Cedar, Cooper, Jasper, Pettis, Ripley, St. Clair, and St. Louis Counties, Mo.). 1914.

CALIFORNIA

1910. Alameda County (see Livermore and San José areas).
1916. Anaheim area (parts of Los Angeles, Orange, and San Bernardino Counties). 1919.
1904. Bakersfield area (part of Kern County). 1905.
1920. Big Valley area (parts of Modoc and Lassen Counties). 1924.
1920. Brawley area (part of Imperial County). 1923.
1907. Butte County (see Colusa and Red Bluff areas).
1907. Butte Valley area (part of Siskiyou County). 1909.
1907. Colusa area (parts of Colusa, Glenn, Tehama and Butte Counties). 1909.
1909. Colusa County (see Woodland, Marysville, and Colusa areas).

CALIFORNIA—continued

1910. Contra Costa County (see Livermore area).
1918. El Centro area (part of Imperial County). 1922.
1904. Eldorado County (see Sacramento area).
1921. Eureka area (part of Humboldt County). 1925.
1900. Fresno area (parts of Fresno and Tulare Counties). 1902.
1912. Fresno area (part of Fresno County). 1914.
1900. Fresno County (see Fresno and Hanford areas).
1912. Fresno County (see Fresno area).
1907. Glenn County (see Colusa area).
1918. Grass Valley area (part of Nevada County). 1921.
1901. Hanford area (parts of Fresno and Kings Counties). 1903.
1915. Healdsburg area (part of Sonoma County). 1917.
1915. Honey Lake area (part of Lassen County). 1917.
1921. Humboldt County (see Eureka area).
1901. Imperial area (part of Imperial County). 1902. (Bureau of Soils, Circular 9.)
1903. Imperial area (parts of Imperial County, Calif., and Yuma County, Ariz.). 1904.
1920. Imperial County (see Brawley, El Centro, and Imperial and Palo Verde areas).
1903. Indio area (part of Riverside County). 1904.
1904. Kern County (see Bakersfield area).
1922. Kern County (see Lancaster area).
1901. Kings County (see Hanford area).
1920. Lassen County (see Honey Lake area and Big Valley area).
1910. Livermore area (parts of Alameda and Contra Costa Counties). 1911.
1903. Los Angeles area (parts of Los Angeles and Orange Counties). 1904.
1916. Los Angeles area (part of Los Angeles County). 1919.
1916. Los Angeles County (see Anaheim, Los Angeles, Pasadena, San Bernardino, San Fernando Valley, San Gabriel, Lancaster, and Ventura areas).
1916. Los Angeles County (see Los Angeles area).
1901. Lower Salinas Valley (part of Monterey County). 1903.
1910. Madera area (part of Madera County). 1911.
1910. Madera County (see Madera area).
1909. Marysville area (parts of Colusa, Placer, Sacramento, Sutter, and Yuba Counties). 1911.
1914. Mendocino County (see Uklah and Willits areas).
1914. Merced area (part of Merced County). 1916.
1914. Merced County (see Merced area).
1908. Modesto-Turlock area (parts of San Joaquin and Stanislaus Counties). 1909.
1908. Modoc County (see Klamath Reclamation Project area, Oreg.).
1920. Modoc County (see Big Valley area).
1908. Monterey County (see Pajaro Valley area).
1911. Monterey County (see Lower Salinas Valley area).
1918. Nevada County (see Grass Valley area).
1916. Orange County (see Anaheim, Los Angeles, and Santa Ana areas).
1908. Pajaro Valley (parts of Monterey and Santa Cruz Counties). 1910.
1915. Pasadena area (parts of Los Angeles and San Bernardino Counties). 1917.
1904. Placer County (see Sacramento area).
1909. Placer County (see Marysville area).
1908. Portersville area (part of Tulare County). 1909.
1910. Red Bluff area (parts of Butte and Tehama Counties). 1912.
1907. Redding area (part of Shasta County). 1908.
1915. Riverside area (parts of Riverside and San Bernardino Counties). 1917.
1915. Riverside County (see Indio, Riverside, and San Bernardino and Palo Verde areas).
1904. Sacramento area (parts of Eldorado, Placer, Sacramento, and Sutter Counties). 1905.
1904. Sacramento County (see Sacramento area).
1909. Sacramento County (see Marysville area).
1904. San Bernardino area (parts of Los Angeles, Riverside, and San Bernardino Counties). 1905.
1916. San Bernardino County (see Anaheim, Pasadena, Riverside, San Bernardino, San Gabriel, and Victorville areas).
1915. San Fernando Valley (part of Los Angeles County). 1917.
1901. San Gabriel area (parts of Los Angeles and San Bernardino Counties). 1903.
1908. San Joaquin County (see Modesto-Turlock and Stockton areas).
1903. San José area (parts of Alameda and Santa Clara Counties). 1904.
1916. San Luis Obispo County (see Santa Maria area).
1900. Santa Ana area (part of Orange County). 1902.
1916. Santa Barbara County (see Santa Maria area).
1903. Santa Clara County (see San José area).
1908. Santa Cruz County (see Pajaro Valley area).
1916. Santa Maria area (parts of San Louis Obispo and Santa Barbara Counties). 1919.
1907. Shasta County (see Redding area).
1919. Shasta Valley area (part of Siskiyou County). 1923.
1907. Siskiyou County (see Klamath Reclamation Project area, Oreg., and Butte Valley area, Calif.).
1919. Siskiyou County (see Shasta Valley area).
1915. Sonoma County (see Healdsburg area).
1908. Stanislaus County (see Modesto-Turlock area).
1905. Stockton area (part of San Joaquin County). 1906.
1904. Sutter County (see Sacramento area).
1909. Sutter County (see Marysville area).
1907. Tehama County (see Colusa and Red Bluff area).
1900. Tulare County (see Fresno area).
1908. Tulare County (see Portersville area).
1914. Uklah area (part of Mendocino County). 1916.
1901. Ventura area (part of Ventura County). 1903.
1917. Ventura area (parts of Los Angeles and Ventura Counties). 1920.
1917. Ventura County (see Ventura area).

CALIFORNIA—continued

1921. Victorville area (part of San Bernardino County) 1924.
1918. Willits area (part of Mendocino County) 1920.
1909. Woodland area (parts of Colusa and Yolo Counties). 1911.
1909. Yolo County (see Woodland area).
1909. Yuba County (see Marysville area).

Reconnaissance

1917. Central-Southern (parts of Los Angeles, Orange, Riverside, San Bernardino and San Diego Counties). 1921.
1915. Lower San Joaquin Valley area (parts of Alameda, Calaveras, Contra Costa, Fresno, Madera, Merced, San Joaquin, Stanislaus, and Tuolumne Counties). 1918.
1916. Middle San Joaquin Valley area (parts of Fresno, Kings, and Tulare Counties). 1919.
1913. Sacramento Valley area (parts of Amador, Butte, Colusa, Contra Costa, Glenn, Placer, Sacramento, San Joaquin, Solano, Sutter, Tehama, Yolo, and Yuba Counties). 1915.
1915. San Diego area (parts of Orange, Riverside, and San Diego Counties). 1918.
1914. San Francisco Bay area (San Francisco and San Mateo Counties, and parts of Alameda, Contra Costa, Marin, Napa, San Joaquin, Santa Clara, Santa Cruz, Solano, and Sonoma Counties). 1917.
1917. Upper San Joaquin Valley area (parts of Fresno, Kern, Kings, San Luis Obispo, Santa Barbara, and Tulare Counties). 1921.

COLORADO

1902. Bent County (see Lower Arkansas Valley area).
1903. Conejos County (see San Luis Valley).
1903. Costilla County (see San Luis Valley).
1910. Delta County (see Uncompahgre Valley).
1905. Grand Junction area (part of Mesa County). 1906.
1904. Greeley area (part of Weld and Larimer Counties). 1905.
1904. Larimer County (see Greeley area).
1902. Lower Arkansas Valley (parts of Bent, Otera, and Prowers Counties). 1903.
1905. Mesa County (see Grand Junction area).
1910. Montrose County (see Uncompahgre Valley).
1910. Ouray County (see Uncompahgre Valley).
1902. Otera County (see Lower Arkansas Valley).
1902. Prowers County (see Lower Arkansas Valley).
1903. Rio Grande County (see San Luis Valley).
1903. Saguache County (see San Luis Valley).
1903. San Luis Valley (parts of Saguache, Rio Grande, Conejos, and Costilla Counties). 1904.
1910. Uncompahgre Valley area (parts of Delta, Montrose, and Ouray Counties). 1912.
1904. Weld County (see Greeley area).

CONNECTICUT

1903. Connecticut Valley (parts of Hartford and Tolland Counties, Conn., and Franklin, Hampshire, and Hampden Counties, Mass.). 1903.
1903. Hartford County (see Connecticut Valley).
1912. New London County. 1913.
1903. Tolland County (see Connecticut Valley).
1911. Windham County. 1912.

DELAWARE

1903. Dover area (part of Kent County). 1904.
1918. Kent County (also see Dover area). 1920.
1915. New Castle County. 1917.
1919. Sussex County. 1924.

FLORIDA

1904. Alachua County (see Gainesville area).
1913. Bradford County. 1914.
1913. Brevard County (see Indian River area).
1912. Citrus County (see Ocala area).
1915. Dade County (see Fort Lauderdale area).
1921. Duval County. 1923.
1906. Escambia County. 1907.
1918. Flagler County. 1922.
1915. Fort Lauderdale area (parts of Dade and Palm Beach Counties). 1915.
1915. Franklin County. 1916.
1903. Gadsden County. 1903.
1904. Gainesville area (parts of Alachua, Levy & Marion Counties). 1905.
1914. Hernando County. 1915.
1916. Hillsborough County. 1918.
1913. Indian River area (parts of Brevard, Palm Beach, and St. Lucie Counties). 1915.
1909. Jackson County (see Mariana area).
1910. Jacksonville area (part of Duval County). 1911.
1907. Jefferson County. 1908.
1905. Leon County. 1906.
1912. Levy County (see Ocala and Gainesville areas).
1909. Mariana area (part of Jackson County). 1910.
1912. Marion County (see Ocala and Gainesville areas).
1912. Ocala area (parts of Citrus, Levy, Marion & Sumter Counties). 1913.
1919. Orange County. 1922.
1915. Palm Beach County (see Fort Lauderdale area and Indian River area).
1913. Pinellas County. 1914.
1914. Putnam County. 1916.
1912. Sumter County (see Ocala area).
1917. St. John's County. 1920.
1913. St. Lucie County (see Indian River area).

GEORGIA

1904. Bainbridge area (part of Decatur County). 1905.
1912. Ben Hill County. 1913.
1916. Brooks County. 1918.
1910. Bulloch County. 1911.
1917. Burke County. 1919.
1919. Butts-Henry Counties. 1922.
1921. Carroll County. 1924.
1911. Chatham County. 1912.
1912. Chattooga County. 1913.
1914. Clay County. 1916.
1901. Cobb County. 1903.
1914. Colquitt County. 1915.
1911. Columbia County. 1912.
1901. Covington area (parts of Jasper, Newton, Walton, Morgan, and Rockdale Counties. 1903.
1919. Coweta and Fayette Counties. 1922.
1916. Crisp County. 1917.
1904. Decatur County (see Bainbridge area).
1914. Dekalb County. 1915.
1904. Dodge County. 1905.
1912. Dougherty County. 1913.
1918. Early County. 1921.
1919. Fayette County (see Coweta and Fayette Counties).
1917. Floyd County. 1921.
1903. Fort Valley area (parts of Macon and Houston Counties). 1904.
1909. Franklin County. 1910.
1911. Glynn County. 1912.
1913. Gordon County. 1914.
1908. Grady County. 1909.
1918. Greene County (see Oconee, Morgan, Greene, and Putnam Counties).
1913. Habersham County. 1914.
1909. Hancock County. 1910.
1919. Henry County (see Butts-Henry Counties).
1903. Houston County (see Fort Valley area).
1914. Jackson County. 1915.
1916. Jasper County (see also Covington area). 1918.
1913. Jeff Davis County. 1914.
1913. Jones County. 1914.
1915. Laurens County. 1916.
1917. Lowndes County. 1920.
1903. Macon County (see Fort Valley area).
1918. Madison County. 1921.
1916. Meriwether County. 1917.
1913. Miller County. 1914.
1919. Mitchell County. 1922.
1920. Monroe County. 1922.
1919. Morgan County (see Oconee, Morgan, Greene, and Putnam Counties and Covington area).
1901. Newton County (see Covington area).
1919. Oconee, Morgan, Greene, and Putnam Counties. 1922.
1918. Pierce County (see also Waycross area). 1920.
1909. Pike County. 1910.
1914. Polk County. 1916.
1918. Pulaski County. 1920.
1918. Putnam County (see Oconee, Morgan, Greene, and Putnam Counties).
1920. Rabun County. 1924.
1916. Richmond County. 1917.
1920. Rockdale County. 1923.
1901. Rockdale County (see Covington area).
1920. Screven County. 1924.
1905. Spalding County. 1905.
1913. Stewart County. 1915.
1910. Sumter County. 1911.
1913. Talbot County. 1914.
1914. Tattnall County. 1915.
1914. Terrell County. 1915.
1908. Thomas County. 1909.
1909. Tift County. 1910.
1912. Troup County. 1913.
1915. Turner County. 1916.
1910. Walker County. 1911.
1901. Walton County (see Covington area).
1906. Ware County (see Waycross area).
1915. Washington County. 1916.
1906. Waycross area (part of Ware and small part of Pierce Counties). 1907.
1915. Wilkes County. 1916.

Reconnaissance

1912. Tattnall County (no map). 1913.

IDAHO

1901. Ada County (see Boise area).
1918. Bannock County (see Portneuf area).
1903. Bingham County (see Blackfoot area).
1903. Blackfoot area (parts of Bingham and Fremont Counties). 1904.
1901. Boise area (parts of Ada and Canyon Counties. 1903.
1901. Canyon County (see Boise area).
1907. Cassia County (see Minidoka area).
1903. Fremont County (see Blackfoot area).
1919. Kootenai County. 1923.
1915. Latah County (see also Lewiston area). 1917.
1917. Lewis County (see Nez Perce and Lewis Counties).
1902. Lewiston area (parts of Nez Perce and Latah Counties. 1903.
1907. Lincoln County (see Minidoka area).
1907. Minidoka area (parts of Lincoln and Cassia Counties). 1908.
1917. Nez Perce County (see Nez Perce and Lewis Counties and Lewiston area).
1917. Nez Perce and Lewis Counties. 1920.
1918. Portneuf area (part of Bannock County). 1921.
1921. Twin Falls area (part of Twin Falls County). 1925.

ILLINOIS

1904. Calhoun County (see O'Fallon area).
1902. Clay County. 1903.
1902. Clinton County. 1903.
1904. Jersey County (see O'Fallon area).
1902. Jo Daviess County (see Dubuque area, Iowa).
1903. Johnson County. 1904.
1903. Knox County. 1904.
1903. McLean County. 1904.
1904. O'Fallon area (parts of Lincoln, St. Charles, Warren, and St. Louis Counties, Mo.; and Calhoun and Jersey Counties, Ill.). 1905.
1903. Sangamon County. 1904.
1902. St. Clair County. 1903.
1902. Tazewell County. 1903.
1912. Will County. 1914.
1903. Winnebago County. 1904.

INDIAN TERRITORY

1906. Tishomingo area. 1907.

INDIANA

1921. Adams County. 1923.
1908. Allen County. 1909.
1916. Benton County. 1917.
1912. Boone County. 1914.
1904. Boonville area (parts of Warrick and Spencer Counties). 1905.

INDIANA—continued

1914. Clinton County. 1915.
1919. Decatur County. 1922.
1913. Delaware County. 1915.
1914. Elkhart County. 1916.
1915. Grant County. 1917.
1906. Greene County. 1907.
1912. Hamilton County. 1914.
1913. Hendricks County. 1915.
1917. Lake County. 1921.
1903. Madison County. 1904.
1907. Marion County. 1908.
1904. Marshall County. 1905.
1912. Montgomery County. 1914.
1905. Newton County. 1906.
1916. Porter County. 1918.
1902. Posey County. 1903.
1904. Scott County. 1905.
1904. Spencer County (see Boonville area).
1915. Starke County. 1917.
1905. Tippecanoe County. 1906.
1912. Tipton County. 1914.
1914. Warren County. 1916.
1904. Warrick County (see Boonville area).
1915. Wells County. 1917.
1915. White County. 1917.

IOWA

1919. Adair County. 1921.
1921. Benton County. 1925.
1917. Blackhawk County. 1919.
1920. Boone County. 1923.
1913. Bremer County. 1914.
1917. Buena Vista County. 1919.
1919. Cedar County. 1921.
1903. Cerro Gordo County. 1904.
1916. Clay County. 1918.
1915. Clinton County. 1917.
1920. Dallas County. 1924.
1922. Delaware County. 1925.
1921. Des Moines County. 1925.
1920. Dickinson County. 1923.
1902. Dubuque area (parts of Dubuque, Jackson, and Jones Counties, Iowa, and Jo Daviess County, Ill.). 1903.
1902. Dubuque County (see Dubuque area).
1920. Dubuque County. 1923.
1920. Emmet County. 1923.
1919. Fayette County. 1922.
1921. Greene County. 1924.
1921. Grundy County. 1923.
1917. Hamilton County. 1920.
1920. Hardin County. 1923.
1917. Henry County. 1919.
1902. Jackson County (see Dubuque area).
1921. Jasper County. 1925.
1922. Jefferson County. 1925.
1919. Johnson County. 1922.
1902. Jones County (see Dubuque area).
1914. Lee County. 1916.
1917. Linn County. 1920.
1918. Louisa County. 1921.
1918. Madison County. 1921.
1919. Mahaska County. 1922.
1919. Marshall County. 1921.
1920. Mills County. 1923.
1916. Mitchell County. 1918.
1917. Montgomery County. 1919.
1914. Muscatine County. 1916.
1921. O'Brien County. 1924.
1921. Page County. 1924.
1918. Palo Alto County. 1921.
1918. Polk County. 1921.
1914. Pottawattamie County. 1916.
1916. Ringgold County. 1918.
1915. Scott County. 1917.
1915. Sioux County. 1917.
1903. Story County. 1904.
1904. Tama County. 1905.
1915. Van Buren County. 1917.
1917. Wapello County. 1919.
1918. Wayne County. 1920.
1914. Webster County. 1916.
1918. Winnebago County. 1921.
1919. Woodbury County. 1923.
1922. Worth County. 1925.
1919. Wright County. 1922.

KANSAS

1904. Allen County. 1905.
1911. Atchison County (see Platte County, Mo.).
1905. Brown County. 1906.
1902. Butler County (see Wichita area).
1912. Cherokee County (also see Parsons area). 1914.
1915. Cowley County. 1917.
1903. Crawford County (see Parsons area).
1904. Finney County (see Garden City area).
1904. Garden City area (parts of Finney and Gray Counties). 1905.
1904. Gray County (see Garden City area).
1912. Greenwood County. 1914.
1912. Jewell County. 1914.
1903. Labette County (see Parsons area).
1919. Leavenworth County (see also Platte County, Mo.). 1923.
1913. Montgomery County. 1915.
1903. Parsons area (parts of Labette, Cherokee, and Crawford Counties). 1904.
1911. Reno County. 1913.
1906. Riley County. 1908.
1903. Russell area (part of Russell County). 1904.
1903. Russell County (see Russell area).
1902. Sedgwick County (see Wichita area).
1911. Shawnee County. 1913.
1902. Wichita area (parts of Sedgwick and Butler Counties). 1903.

Reconnaissance

1910. Western Kansas (Barber, Barton, Cheyenne, Clark, Comanche, Decatur, Edwards, Ellis, Finney, Ford, Gove, Graham, Grant, Gray, Greeley, Hamilton, Haskell, Hodgeman, Kearney, Kiowa, Lane, Logan, Meade, Morton, Ness, Norton, Osborne, Pawnee, Phillipps, Pratt, Rawlins, Rooks, Rush, Russell, Scott, Seward, Sheridan, Sherman, Smith, Stafford, Stanton, Stevens, Thomas, Trego, Wallace, and Wichita Counties). 1912.

KENTUCKY

1912. Christian County. 1914.
1921. Garrard County. 1924.
1915. Jessamine County. 1916.
1919. Logan County. 1922.
1905. McCracken County. 1906.
1905. Madison County. 1906.
1903. Mason County. 1904.
1919. Muhlenberg County. 1924.
1910. Rockcastle County. 1911.
1903. Scott County. 1904.
1916. Shelby County. 1919.
1902. Union County. 1903.
1904. Warren County. 1905.

LOUISIANA

1903. Acadia Parish. 1904.
1908. Bienville Parish. 1909.
1906. Caddo Parish. 1907.
1901. Calcasieu Parish (see Lake Charles area).
1910. Concordia Parish. 1911.

LOUISIANA—continued

1904. De Soto Parish. 1905.
1905. East Baton Rouge Parish. 1905.
1908. East Carroll and West Carroll Parishes. 1909.
1912. East Feliciana Parish. 1913.
1911. Iberia Parish. 1912.
1903. Jefferson Parish (see New Orleans area).
1915. LaFayette Parish. 1916.
1901. Lake Charles Area (part of Calcasieu Parish). 1903.
1918. LaSalle Parish. 1920.
1909. Lincoln Parish. 1910.
1921. Natchitoches Parish. 1925.
1903. New Orleans area (parts of Jefferson, Orleans, Plaquemines, St. Charles, and St. John the Baptist Parishes). 1904.
1903. Orleans Parish (see New Orleans area).
1903. Ouachita Parish. 1904.
1903. Plaquemines Parish (see New Orleans area).
1916. Rapides Parish. 1918.
1919. Sabine Parish. 1922.
1903. St. Charles Parish (see New Orleans area).
1903. St. John the Baptist Parish (see New Orleans area).
1917. St. Martin Parish. 1919.
1905. Tangipahoa Parish. 1906.
1922. Washington Parish. 1925.
1914. Webster Parish. 1916.
1908. West Carroll Parish (see East and West Carroll Parishes).
1907. Winn Parish. 1909.

MAINE

1917. Aroostook area (part of Aroostook County). 1921.
1917. Aroostook County (see Aroostook and Caribou Areas).
1908. Caribou area (part of Aroostook County). 1910.
1915. Cumberland County. 1917.
1909. Orono area (part of Penobscot County). 1910.
1909. Penobscot County (see Orono area).

MARYLAND

1921. Allegany County. 1925.
1909. Anne Arundel County. 1910.
1917. Baltimore County. 1919.
1900. Calvert County. 1902.
1907. Caroline County. (See Easton area.)
1919. Carroll County. 1922.
1900. Cecil County. 1902.
1918. Charles County. 1922.
1907. Easton area (Caroline, Queen Annes, Talbot Counties). 1909.
1919. Frederick County. 1922.
1901. Harford County. 1903.
1916. Howard County. 1917.
1900. Kent County. 1902.
1914. Montgomery County. 1916.
1901. Prince Georges County. 1903.
1907. Queen Annes County. (See Easton area.)
1920. Somerset County. 1924.
1900. St Marys County. 1902.
1907. Talbot County. (See Easton area.)
1917. Washington County. 1919.
1921. Wicomico County. 1925.
1903. Worcester County. 1904.

MASSACHUSETTS

1903. Connecticut Valley (parts of Hampshire, Hampden, and Franklin Counties, Mass., and Hartford and Tolland Counties, Conn.). 1904.
1903. Franklin County (see Connecticut Valley).
1903. Hampden County(see Connecticut County).
1903. Hampshire County (see Connecticut Valley).
1920. Norfolk, Bristol, and Barnstable Counties. 1924.
1911. Plymouth County. 1912.

MICHIGAN

1904. Alger County (see Munising area).
1901. Allegan County. 1903.
1904. Alma area (part of Gratiot County). 1905.
1904. Bay County (see Saginaw area).
1916. Calhoun County. 1919.
1906. Cass County. 1907.
1912. Genesee County. 1914.
1904. Gratiot County (see Alma area).
1904. Huron County (see Saginaw area).
1902. Monroe County (see Toledo area, Ohio).
1904. Munising area (part of Alger County). 1905.
1903. Oakland County (see Oxford and Pontiac areas).
1904. Owosso area (part of Shiawassee County). 1905.
1905. Oxford area (part of Oakland County). 1906.
1903. Pontiac area (part of Oakland County). 1904.
1904. Saginaw area (parts of Saginaw, Bay, Huron, and Tuscola Counties). 1905.
1904. Saginaw County (see Saginaw area).
1904. Shiawassee County (see Owosso area).
1921. St. Joseph County. 1923.
1901. Tuscola County (see Saginaw area).
1908. Wexford County. 1909.

Reconnaissance

1921. Ontonagon County. 1923.

MINNESOTA

1916. Anoka County. 1918.
1906. Blue Earth County. 1907.
1905. Carlton area (parts of Carlton and St. Louis Counties, Minn., and Douglas County, Wis.). 1906.
1905. Carlton County (see Carlton area).
1906. Crookston area (part of Polk County). 1907.
1913. Goodhue County. 1915.
1903. Lyon County (see Marshall area).
1903. Marshall area (part of Lyon County). 1904.
1914. Pennington County. 1916.
1906. Polk County (see Crookston area).
1914. Ramsey County. 1916.
1909. Rice County. 1911.
1919. Stevens County. 1922.
1905. St. Louis County (see Carlton area, Minn., and Superior area, Wis.).

MISSISSIPPI

1910. Adams County. 1911.
1921. Alcorn County. 1924.
1917. Amite County. 1919.
1904. Biloxi area (part of Harrison County). 1904.
1915. Chickasaw County. 1917.
1920. Choctaw County. 1923.
1914. Clarke County. 1915.
1909. Clay County. 1911.
1915. Conhoma County. 1916.
1917. Covington County. 1919.
1904. Copiah County (see Jackson and Crystal Springs areas).
1905. Crystal Springs area (parts of Simpson and Copiah Counties). 1905.
1911. Forrest County. 1912.
1922. George County. 1925.
1915. Grenada County. 1917.
1903. Hancock County (see McNeill area).
1904. Harrison County (see Biloxi area).
1916. Hinds County (see also Jackson area). 1918.
1908. Holmes County. 1909.
1902. Issaquena County (see Smedes and Yazoo areas).
1904. Jackson area (parts of Copiah, Hinds, Rankin, and Simpson Counties). 1904.
1909. Jackson County (see Scranton area).
1907. Jasper County. 1908.
1915. Jefferson Davis County. 1916.
1913. Jones County. 1915.
1912. Lafayette County. 1914.
1919. Lamar County. 1922.
1910. Lauderdale County. 1912.
1916. Lee County. 1918.
1912. Lincoln County. 1913.
1911. Lowndes County. 1912.
1917. Madison County (see also Smedes area). 1920.
1908. Monroe County. 1910.
1906. Montgomery County. 1907.
1903. McNeill area (parts of Pearl River and Hancock Counties). 1904.
1916. Newton County. 1918.
1910. Noxubee County. 1911.
1907. Oktibbeha County. 1908.
1918. Pearl River County (see also McNeill area). 1920.
1918. Pike County. 1921.
1906. Pontotoc County. 1907.
1907. Prentiss County. 1908.
1904. Rankin County (see Jackson area).
1909. Scranton area (part of Jackson County). 1910.
1902. Sharkey County (see Smedes and Yazoo areas).
1919. Simpson County (see also Jackson and Crystal Springs areas). 1921.
1902. Smedes area (parts of Yazoo, Madison, Issaquena and Sharkey Counties). 1903.
1920. Smith County. 1923.
1912. Warren County. 1914.
1911. Wayne County. 1913.
1913. Wilkinson County. 1915.
1912. Winston County. 1913.
1901. Yazoo area (parts of Yazoo, Sharkey, and Issaquena Counties). 1903.
1902. Yazoo County (see Smedes and Yazoo areas).

MISSOURI

1921. Andrew County. 1925.
1909. Atchison County. 1910.
1916. Barry County. 1918.
1912. Barton County. 1914.
1908. Bates County. 1910.
1915. Buchanan County. 1917.
1921. Caldwell County. 1924.
1916. Callaway County. 1919.
1910. Cape Girardeau County. 1912.
1912. Carroll County. 1914.
1912. Cass County. 1914.
1909. Cedar County. 1911.
1918. Charlton County. 1921.
1920. Cole County. 1924.
1909. Cooper County. 1911.
1905. Crawford County. 1906.
1914. DeKalb County. 1916.
1914. Dunklin County. 1916.
1911. Franklin County. 1913.
1913. Greene County. 1915.
1914. Grundy County. 1916.
1914. Harrison County. 1916.
1902. Howell County. 1903.
1910. Jackson County. 1912.
1914. Johnson County. 1916.
1917. Knox County. 1921.
1911. Laclede County. 1912.
1920. Lafayette County. 1923.
1917. Lincoln County (see also O'Fallon area). 1920.
1911. Macon County. 1913.
1910. Marion County. 1911.
1912. Miller County. 1914.
1921. Mississippi County. 1924.
1915. Newton County. 1917.
1913. Nodaway County. 1915.
1904. O'Fallon area (parts of Lincoln, St. Charles, Warren, and St. Louis Counties, Mo., and Calhoun and Jersey Counties, Ill). 1905.
1910. Pemiscot County. 1912.
1913. Perry County. 1915.
1914. Pettis County. 1916.
1912. Pike County. 1914.
1911. Platte County (also small parts of Atchison and Leavenworth Counties, Kan.). 1912.
1906. Putnam County. 1908.
1913. Ralls County. 1914.
1918. Reynolds County. 1921.
1915. Ripley County. 1917.
1904. Saline County. 1905.
1905. Scotland County. 1906.
1903. Shelby County. 1904.
1904. St. Charles County (see O'Fallon area).
1918. St. Francois County. 1921.
1904. St. Louis County (see O'Fallon area).
1919. St. Louis County. 1923.
1912. Stoddard County. 1914.
1917. Texas County. 1919.
1904. Warren County (see O'Fallon area).
1904. Webster County. 1905.

Reconnaissance

1911. Ozark region, Arkansas and Missouri (Baxter, Benton, Boone, Carroll, Cleburne, Conway, Crawford, Faulkner, Fulton, Izard, Johnson, Madison, Marion, Newton, Pope, Searcy, Sharp, Stone, Van Buren, and Washington Counties, and parts of Franklin, Independence, Lawrence, Lonoke, Pulaski, Randolph, and White Counties, Ark.; and Barry, Benton, Camden, Carter, Christian, Cole, Crawford, Dade, Dallas, Dent, Douglas, Franklin, Gasconade, Greene, Hickory, Howell, Iron, Jefferson, Laclede, Lawrence, McDonald, Madison, Maries, Miller, Moniteau, Morgan, Newton, Oregon, Osage, Ozark, Perry, Phelps, Polk, Pulaski, Reynolds, Ste. Genevieve, St. Francois, Shannon, Stone, Taney, Texas, Washington, Wayne, Webster, and Wright Counties, and parts of Barton, Bollinger, Butler, Cape Girardeau, Cedar, Cooper, Jasper, Pettis, Ripley, St. Clair, and St. Louis Counties, Mo.). 1914.

MONTANA

1902. Billings area (parts of Yellowstone and Stillwater Counties). 1903.
1914. Bitter Root Valley area (parts of Missoula and Ravalli Counties). 1917.
1905. Gallatin County (see Gallatin Valley area).
1905. Gallatin Valley area (part of Gallatin County). 1906.
1914. Missoula County (see Bitter Root Valley area).
1914. Ravalli County (see Bitter Root Valley area).
1902. Stillwater County (see Billings area).
1902. Yellowstone County (see Billings area).

NEBRASKA

1921. Antelope County. 1924.
1919. Banner County. 1921.
1921. Boone County. 1925.
1916. Box Butte County. 1918.
1904. Buffalo County (see Kearney and Green Island areas).
1913. Cass County. 1914.
1917. Chase County. 1919.
1918. Cheyenne County. 1920.
1919. Dakota County. 1921.
1915. Dawes County. 1917.
1904. Dawson County (see Kearney area).
1922. Dawson County. 1925.
1921. Deuel County. 1924.
1916. Dodge County. 1918.
1913. Douglas County. 1915.
1916. Fillmore County. 1918.
1914. Gage County. 1916.
1904. Gosper County (see Kearney area).
1903. Grand Island area (parts of Hall, Buffalo, Hamilton, and Merrick Counties). 1904.
1916. Hall County (also see Grand Island area). 1918.
1903. Hamilton County (see Grand Island area).
1920. Howard County. 1924.
1921. Jefferson County. 1925.
1920. Johnson County. 1924.
1904. Kearney area (parts of Dawson, Buffalo, Phelps, Kearney, and Gosper Counties). 1904.
1904. Kearney County (see Kearney area).
1916. Kimball County. 1917.
1906. Lancaster County. 1908.
1907. Lincoln County (see North Platte area).
1920. Madison County (see also Stanton area). 1923.
1903. Merrick County (see Grand Island area).
1917. Morrill County. 1920.
1922. Nance County. 1925.
1914. Nemaha County. 1916.
1907. North Platte area (part of Lincoln County). 1908.
1912. Otoe County. 1913.
1920. Pawnee County. 1924.
1921. Perkins County. 1924.
1917. Phelps County (see also Kearney area). 1919.
1903. Pierce County (see Stanton area).
1915. Polk County. 1917.
1919. Redwillow County. 1921.
1915. Richardson County. 1917.
1905. Sarpy County. 1906.
1913. Saunders County. 1915.
1913. Scotts Bluff County (see also Fort Laramie area, Wyo.). 1915.
1914. Seward County. 1916.
1918. Sheridan County. 1921.
1919. Sioux County. 1922.
1903. Stanton County (see Stanton area).
1903. Stanton area (parts of Pierce, Madison, Stanton, and Wayne Counties). 1904.
1914. Thurston County. 1916.
1915. Washington County. 1917.
1917. Wayne County (see also Stanton area). 1919.

Reconnaissance

1911. Western Nebraska (Adams, Banner, Blaine, Box, Butte, Boyd, Brown, Buffalo, Chase, Cherry, Cheyenne, Custer, Dawes, Dawson, Deuel, Dundy, Frontier, Franklin, Furnas, Garden, Garfield, Gosper, Grant, Greeley, Hall, Harlan, Hayes, Hitchcock, Hooker, Holt, Howard, Kearney, Keith, Keyapaha, Kimball, Lincoln, Logan, Loup, McPherson, Morrill, Perkins, Phelps, Redwillow, Rock, Scottsbluff, Sheridan, Sherman, Sioux, Thomas, Valley, Webster, and Wheeler Counties). 1913.

NEVADA

1909. Churchill County (see Fallon area).
1909. Fallon area (parts of Lyon and Churchill Counties). 1911.
1909. Lyon County (see Fallon area).

NEW HAMPSHIRE

1909. Hillsboro County (see Nashua area).
1906. Merrimack County. 1908.
1909. Nashua area (part of Hillsboro County). 1910.

NEW JERSEY

1915. Atlantic County (see Camden, Millville, and Chatsworth areas).
1917. Belvidere area (parts of Hunterdon, Mercer, Morris, Somerset, Sussex, and Warren Counties). 1920.
1919. Bernardsville area (parts of Hunterdon, Middlesex, Morris, Somerset, Sussex, and Union Counties). 1923.
1915. Burlington County (see Camden, Trenton, and Chatsworth area).
1915. Camden area (parts of Atlantic, Burlington, Camden, Cumberland, Gloucester, and Salem Counties). 1917.
1915. Camden County (see Camden and Chatsworth areas).
1918. Cape May County (see Millville area).
1919. Chatsworth area (parts of Atlantic, Burlington, Monmouth, and Camden Counties and all of Ocean County). 1923.
1915. Cumberland County (see Camden, Millville, and Salem areas).
1913. Freehold area (parts of Monmouth and Middlesex Counties). 1916.
1915. Gloucester County (see Camden, Millville, and Salem areas).
1917. Hunterdon County (see Belvidere, Trenton, and Bernardsville areas).

NEW JERSEY—continued

1917. Mercer County (see Belvidere and Trenton areas).
1913. Middlesex County (see Freehold, Trenton, and Bernardsville areas).
1917. Millville area (Cape May County and parts of Atlantic, Cumberland, Gloucester, and Salem Counties). 1921.
1913. Monmouth County (see Freehold, Chatsworth, and Trenton areas).
1917. Morris County (see Belvidere, Sussex, and Bernardsville areas).
1902. Ocean County (see Trenton and Chatsworth areas).
1911. Passaic County (see Sussex area).
1901. Salem area (parts of Cumberland, Gloucester, and Salem Counties). 1903.
1915. Salem County (see Camden, Millville, and Salem areas).
1917. Somerset County (see Belvidere, Trenton, and Bernardsville areas).
1917. Sussex County (see Belvidere, Sussex, and Bernardsville areas).
1911. Sussex area (parts of Morris, Passaic, Sussex, and Warren Counties). 1913.
1902. Trenton area (parts of Burlington, Hunterdon, Mercer, Middlesex, Monmouth, Somerset, and Ocean Counties, N. J., and Bucks County, Pa.). 1903.
1919. Union County (see Bernardsville area).
1917. Warren County (see Belvidere and Sussex areas).

NEW MEXICO

1912. Bernalillo County (see Middle Rio Grande area).
1912. Dona Ana County (see Mesilla Valley area).
1912. Mesilla Valley area (parts of Dona Ana County, N. Mex., and El Paso County, Tex.). 1914.
1912. Middle Rio Grande Valley area (parts of Bernalillo, Sandoval, Socorro, and Valencia Counties). 1914.
1912. Sandoval County (see Middle Rio Grande area).
1912. Socorro County (see Middle Rio Grande area).
1912. Valencia County (see Middle Rio Grande area).

NEW YORK

1904. Auburn area (part of Cayuga County). 1905.
1902. Bigflats area (parts of Chemung and Steuben Counties). 1903.
1905. Binghamton area (part of Broome County). 1908.
1905. Broome County (see Binghamton area).
1903. Cayuga County (see Auburn and Syracuse areas).
1914. Chautauqua County (see also Westfield area). 1916.
1902. Chemung County (see Bigflats area).
1918. Chenango County. 1920.
1914. Clinton County. 1916.
1916. Cortland County. 1917.
1907. Dutchess County. 1909.
1904. Essex County (see Vergennes area, Vermont).
1911. Jefferson County. 1913.
1903. Kings County (see Long Island area).
1908. Livingston County. 1910.
1903. Long Island area (parts of Kings, Nassau, Queens, and Suffolk Counties). 1904.
1902. Lyons area (parts of Ontario, Seneca, and Wayne Counties). 1903.
1906. Madison County. 1907.
1910. Monroe County. 1912.
1908. Montgomery County. 1909.
1903. Nassau County (see Long Island area).
1906. Niagara County. 1908.
1913. Oneida County. 1915.
1903. Onondaga County (see Syracuse area).
1910. Ontario County (see also Lyons area). 1912.
1912. Orange County. 1914.
1917. Oswego County (see also Syracuse area). 1919.
1918. Putnam County (see White Plains area).
1903. Queens County (see Long Island area).
1918. Rockland County (see White Plains area).
1917. Saratoga County. 1919.
1915. Schoharie County. 1917.
1902. Seneca County (see Lyons area).
1902. Steuben County (see Bigflats area).
1903. Syracuse area (parts of Cayuga, Onondaga, and Oswego Counties). 1904.
1903. Suffolk County (see Long Island area).
1905. Tompkins County. 1906.
1920. Tompkins County. 1924.
1909. Washington County. 1911.
1902. Wayne County (see Lyons area).
1919. Wayne County. 1923.
1918. Westchester County (see White Plains area).
1901. Westfield area (part of Chautauqua County). 1903.
1919. White Plains area (Putnam Rockland, and Westchester Counties). 1922.
1916. Yates County. 1918.

NORTH CAROLINA

1901. Alamance County. 1903.
1902. Alexander County (see Hickory area).
1915. Alleghany County. 1917.
1915. Anson County. 1917.
1912. Ashe County. 1914.
1903. Asheville area (parts of Buncombe, Haywood, and Madison Counties). 1904.
1917. Beaufort County (see also Craven area). 1919.
1918. Bertie County. 1920.
1914. Bladen County. 1915.
1920. Buncombe County. 1923.
1903. Buncombe County (see Asheville and Mount Mitchell areas).
1902. Burke County (see Hickory area).
1910. Cabarrus County. 1911.
1917. Caldwell County (see also Hickory area). 1919.
1901. Cary area (part of Wake County). 1903.
1908. Caswell County. 1910.
1902. Catawba County (see Hickory and Statesville areas).
1921. Cherokee County. 1924.
1906. Chowan County. 1907.

NORTH CAROLINA—continued

1916. Cleveland County. 1918.
1915. Columbus County. 1917.
1903. Craven area (parts of Beaufort, Craven, Greene, Jones, Lenoir, and Pitt Counties). 1904.
1903. Craven County (see Craven and Raleigh to Newbern areas).
1922. Cumberland County. 1925.
1915. Davidson County. 1917.
1901. Davie County (see Statesville area).
1905. Duplin County. 1905.
1920. Durham County. 1924.
1907. Edgecombe County. 1908.
1913. Forsyth County. 1914.
1909. Gaston County. 1911.
1910. Granville County. 1912.
1913. Greene County (see Craven and Raleigh to Newbern areas).
1920. Guilford County. 1923.
1916. Halifax County. 1918.
1916. Harnett County. 1917.
1922. Haywood County (see also Asheville area). 1925.
1907. Henderson County. 1908.
1916. Hertford County. 1917.
1902. Hickory area (parts of Alexander, Burke, Caldwell, Catawba, Iredell, and Lincoln Counties). 1903.
1918. Hoke County. 1921.
1909. Hyde County (see Lake Mattamuskeet area).
1902. Iredell County (see Hickory and Statesville areas).
1911. Johnston County (see also Raleigh to Newbern area). 1913.
1903. Jones County (see Craven and Raleigh to Newbern areas).
1909. Lake Mattamuskeet area (part of Hyde County). 1910.
1903. Lenoir County (see Craven and Raleigh to Newbern areas).
1914. Lincoln County (see also Statesville area). 1916.
1903. Madison County (see Asheville and Mount Mitchell areas).
1902. McDowell County (see Mount Mitchell area).
1910. Mecklenburg County (see also Statesville area). 1912.
1902. Mitchell County (see Mount Mitchell area).
1919. Moore County. 1922.
1902. Mt. Mitchell area (parts of Buncombe, McDowell, Madison, Mitchell, and Yancey Counties). 1903.
1906. New Hanover County. 1907.
1921. Onslow County. 1923.
1918. Orange County. 1921.
1905. Pasquotank and Perquimans Counties. 1905.
1912. Pender County. 1914.
1905. Perquimans County (see Pasquotank and Perquimans Counties).
1909. Pitt County (see also Craven area). 1910.
1900. Raleigh to Newbern area (parts of Craven, Greene, Johnston, Jones, Lenoir, Wake, and Wayne Counties). 1901.
1913. Randolph County. 1915.
1911. Richmond County. 1912.
1908. Robeson County. 1909.
1914. Rowan County (see also Statesville area). 1915.
1909. Scotland County. 1911.
1916. Stanley County. 1918.
1901. Statesville area (parts of Catawba, Davie, Iredell, Lincoln, Mecklenburg, and Rowan Counties). 1903.
1906. Transylvania County. 1907.
1920. Tyrrell County. 1924.
1914. Union County. 1916.
1918. Vance County. 1921.
1914. Wake County (see also Cary and Raleigh to Newbern areas). 1916.
1915. Wayne County (see also Raleigh to Newbern areas). 1916.
1918. Wilkes County. 1921.
1902. Yancey County (see Mount Mitchell area).

NORTH DAKOTA

1907. Adams County (see Morton area).
1912. Barnes County (see also Jamestown area). 1914.
1915. Bottineau County. 1917.
1904. Cando area (part of Towner County). 1905.
1905. Carrington area (parts of Foster and Griggs Counties). 1906.
1903. Cass County (see Fargo area).
1914. Dickey County. 1916.
1903. Fargo area (part of Cass County). 1904.
1905. Foster County (see Carrington area).
1902. Grand Forks area (part of Grand Forks County). 1903.
1902. Grand Forks County (see Grand Forks area).
1905. Griggs County (see Carrington area).
1907. Hettinger County (see Morton area).
1903. Jamestown area (parts of Barnes and Stutsman Counties). 1904.
1914. Lamoure County. 1917.
1921. McHenry County. 1925.
1907. McKenzie area (part of McKenzie County). 1908.
1907. McKenzie County (see McKenzie area).
1907. Morton area (parts of Adams, Hettinger and Morton Counties). 1908.
1907. Morton County (see Morton area).
1906. Ransom County. 1907.
1906. Richland County. 1909.
1917. Sargent County. 1920.
1903. Stutsman County (see Jamestown area).
1904. Towner County (see Cando area).
1918. Traill County. 1920.
1906. Williams County (see Williston area).
1906. Williston area (part of Williams County). 1908.

Reconnaissance

1908. Western North Dakota (Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Divide, Dunn, Emmons, Golden Valley, Hettinger, McHenry, McKenzie, McLean, Mercer, Morton, Mountrail, Oliver, Renville, Stark, Sheridan, Ward, and Williams Counties). 1910.

OHIO

1903. Ashtabula County (see Ashtabula area).
1903. Ashtabula area (part of Ashtabula County). 1904.
1909. Auglaize County. 1910.
1905. Cleveland area (parts of Cuyahoga, Lorain, Medina and Summit Counties). 1906.
1902. Columbus area (parts of Fairfield, Franklin, Licking, Madison, and Pickaway Counties). 1903.
1904. Coshocton County. 1905.
1905. Cuyahoga County (see Cleveland area).
1905. Delaware County (see Westerville area).
1902. Fairfield County (see Columbus area).
1905. Franklin County (see Westerville and Columbus areas).
1915. Geauga County. 1916.
1915. Hamilton County. 1917.
1905. Licking County (see Westerville and Columbus areas).
1905. Lorain County (see Cleveland area).
1902. Lucas County (see Toledo area).
1905. Madison County (see Westerville and Columbus areas).
1917. Mahoning County. 1919.
1916. Marion County. 1918.
1904. Medina County (see Wooster and Cleveland areas).
1906. Meigs County. 1908.
1916. Miami County. 1918.
1900. Montgomery County. 1902.
1902. Ottawa County (see Toledo area).
1914. Paulding County. 1915.
1902. Pickaway County (see Columbus area).
1914. Portage County. 1916.
1917. Sandusky County. 1920.
1913. Stark County (also see Wooster area). 1915.
1904. Summit County (see Wooster and Cleveland areas).
1902. Toledo area (parts of Lucas, Ottawa, and Wood Counties, Ohio, and Monroe County, Mich.). 1903.
1914. Trumbull County. 1916.
1905. Union County (see Westerville area).
1901. Wayne County (see Wooster area).
1905. Westerville area (parts of Delaware, Franklin, Licking, Madison, and Union Counties). 1906.
1902. Wood County (see Toledo area).
1904. Wooster area (parts of Medina, Stark, Summit, and Wayne Counties). 1905.

Reconnaissance

1912. Entire State. 1915.

OKLAHOMA

1906. Bryan County (see Tishomingo area).
1914. Bryan County. 1915.
1917. Canadian County. 1919.
1906. Johnston County (see Tishomingo area).
1915. Kay County. 1917.
1906. Marshall County (see Tishomingo area).
1913. Muskogee County. 1915.
1906. Oklahoma County. 1907.
1916. Payne County. 1918.
1914. Roger Mills County. 1916.
1906. Tishomingo area, Indian Territory (part of District No. 22, or parts of Bryan, Johnston, and Marshall Counties). 1907.

OREGON

1903. Baker City area (parts of Baker and Union Counties). 1904.
1903. Baker County (see Baker City Area).
1920. Benton County. 1924.
1909. Coos County. (See Marshfield area.)
1909. Curry County. (See Marshfield area.)
1912. Hood River–White Salmon River area (parts of Hood River County, Oregon and Klickitat and Shamania Counties, Wash.). 1914.
1911. Jackson County (see Medford area).
1919. Josephine County. 1923.
1908. Klamath County (see Klamath reclamation project area).
1908. Klamath reclamation project area (parts of Klamath County, Oreg., and Modoc and Siskiyou Counties, Calif.). 1910.
1909. Marshfield area (parts of Coos and Curry Counties). 1911.
1903. Marion County (see Salem area).
1911. Medford area (part of Jackson County). 1913.
1919. Multnomah County. 1922.
1903. Polk County (see Salem area).
1903. Salem area (parts of Marion and Polk Counties). 1904.
1903. Union County (see Baker City area).
1919. Washington County. 1923.
1917. Yamhill County. 1920.

PENNSYLVANIA

1904. Adams County. 1905.
1911. Bedford County (see also Johnstown area). 1913.
1909. Berks County. 1911.
1915. Blair County (see also Johnstown area). 1917.
1911. Bradford County. 1913.

PENNSYLVANIA—continued

1902. Bucks County (see Trenton area, New Jersey).
1915. Cambria County (see also Johnstown area). 1917.
1908. Center County. 1910.
1905. Chester County. 1906.
1916. Clearfield County. 1919.
1903. Clinton County (see Lockhaven area).
1901. Dauphin County (see Lebanon area).
1910. Erie County. 1911.
1921. Greene County. 1925.
1907. Johnstown area (parts of Blair, Bedford, and Cambria Counties). 1909.
1900. Lancaster area (part of Lancaster County). 1902.
1914. Lancaster County (see also Lancaster and Lebanon areas). 1916.
1901. Lebanon area (parts of Dauphin, Lancaster, and Lebanon Counties). 1903.
1901. Lebanon County (see Lebanon area).
1912. Lehigh County. 1914.
1903. Lockhaven area (part of Clinton County). 1904.
1917. Mercer County. 1919.
1905. Montgomery County. 1906.
1910. Washington County. 1911.
1912. York County. 1914.

Reconnaissance

1911. Northeastern Pennsylvania (Bradford, Clinton, Lackawanna, Lycoming, Pike, Sullivan, Susquehanna, Tioga, Wayne, and Wyoming Counties). 1913.
1908. Northwestern Pennsylvania (Cameron, Crawford, Elk, Erie, Forest, Lawrence, McKean, Mercer, Potter, Venango, and Warren Counties). 1910.
1910. South Central Pennsylvania (Adams, Bedford, Blair, Cambria, Center, Clearfield, Cumberland, Franklin, Fulton, Huntington, Juniata, Mifflin, Perry, Snyder, Somerset, and Union Counties). 1912.
1912. Southeastern Pennsylvania (Berks, Bucks, Carbon, Chester, Columbia, Dauphin, Delaware, Lancaster, Lebanon, Lehigh, Luzerne, Monroe, Montgomery, Montour, Northampton, Northumberland, Philadelphia, Schuylkill, and York Counties). 1914.
1909. Southwestern Pennsylvania (Allegheny, Armstrong, Beaver, Butler, Clarion, Fayette, Greene, Indiana, Jefferson, Washington, and Westmoreland Counties). 1911.

PORTO RICO

1902. Soil survey from Arecibo to Ponce. 1903.

RHODE ISLAND

1904. Entire State. 1905.

SOUTH CAROLINA

1902. Abbeville area (parts of Abbeville, Anderson, Greenwood, and Laurens Counties). 1903.
1902. Abbeville County (see Abbeville area).
1909. Anderson County (see also Abbeville area). 1910.
1913. Bamberg County. 1914.
1912. Barnwell County. 1914.
1916. Berkeley County. 1918.
1904. Calhoun County (see Orangeburg area).
1903. Campobello area (parts of Greenville and Spartanburg Counties). 1904.
1904. Charleston area (parts of Charleston and Colleton Counties). 1905.
1904. Charleston County (see Charleston area).
1905. Cherokee County. 1906.
1912. Chester County. 1913.
1914. Chesterfield County. 1915.
1910. Clarendon County. 1912.
1904. Colleton County (see Charleston area).
1909. Conway area (part of Horry County). 1910.
1902. Darlington area (Darlington County and part of Lee County). 1903.
1902. Darlington County (see Darlington area).
1915. Dorchester County. 1917.
1911. Fairfield County. 1913.
1914. Florence County. 1916.
1911. Georgetown County. 1912.
1921. Greenville County. 1924.
1903. Greenville County (see Campobello area).
1902. Greenwood County (see Abbeville area).
1915. Hampton County. 1917.
1918. Horry County (see also Conway area). 1920.
1919. Kershaw County. 1922.
1904. Lancaster County. 1905.
1902. Laurens County (see Abbeville area).
1907. Lee County (see also Darlington area). 1908.
1922. Lexington County. 1925.
1917. Marlboro County. 1919.
1918. Newberry County. 1921.
1907. Oconee County. 1908.
1904. Orangeburg area (parts of Calhoun and Orangeburg Counties). 1905.
1913. Orangeburg County (see also Orangeburg area). 1915.
1916. Richland County. 1918.
1909. Saluda County. 1910.
1921. Spartanburg County. 1924.
1903. Spartanburg County (see Campobello area).
1907. Sumter County. 1908.
1913. Union County. 1914.
1905. York County. 1906.

SOUTH DAKOTA

1920. Beadle County. 1924.
1907. Belle Fourche area (parts of Butte and Meade Counties). 1908.
1903. Brookings area (part of Brookings County). 1904.
1903. Brookings County (see Brookings area).
1907. Butte County (see Belle Fourche area).
1921. McCook County. 1924.
1907. Meade County (see Belle Fourche area).
1921. Union County. 1924.

Reconnaissance

1909. Western South Dakota (Armstrong, Bennett, Butte, Corson, Custer, Dewey, Fall River, Gregory, Harding, Lawrence, Lyman, Meade, Mellette, Pennington, Perkins, Shannon, Stanley, Todd, Tripp, Washabaugh, Washington, and Schnasse Counties). 1911.

TENNESSEE

1903. Bledsoe County (see Pikeville area).
1904. Cocke County (see Greeneville area).
1908. Coffee County. 1910.
1903. Cumberland County (see Pikeville area).
1903. Davidson County. 1904.
1907. Giles County. 1909.
1906. Grainger County. 1907.
1904. Greene County (see Greeneville area).
1904. Greeneville area (parts of Greene, Hawkins, Cocke, and Sullivan Cos., Tennessee; and Madison County, North Carolina). 1905.
1904. Hawkins County (see Greeneville area).
1905. Henderson County. 1906.
1922. Henry County. 1925.
1913. Jackson County. 1915.
1904. Lawrence County. 1905.
1906. Madison County. 1907.
1919. Meigs County. 1921.
1901. Montgomery County. 1903.
1908. Overton County. 1909.
1903. Pikeville area (parts of Bledsoe, Cumberland, Rhea, and Van Buren Counties). 1904.
1912. Putnam County. 1914.
1903. Rhea County (see Pikeville area).
1912. Robertson County. 1914.
1916. Shelby County. 1919.
1904. Sullivan County (see Greeneville area).
1909. Sumner County. 1910.
1903. Van Buren County (see Pikeville area).

TEXAS

1904. Anderson County. 1905.
1903. Angelina County (see Lufkin area).
1912. Archer County. 1914.
1904. Austin area (parts of Bastrop, Caldwell, Hays, Travis, and Williamson Counties). 1905.
1905. Basque County (see Waco area).
1904. Bastrop County (see Austin area).
1907. Bastrop County (see also San Marcos area). 1908.
1916. Bell County. 1918.
1904. Bexar County (see San Antonio area).
1918. Bowie County. 1921.
1902. Brazoria area (part of Brazoria County). 1903.
1902. Brazoria County (see Brazoria area).
1914. Brazos County. 1916.
1907. Brownsville area (part of Cameron County). 1908.
1906. Caldwell County (see Austin area).
1907. Bastrop County (see also San Marcos area). 1908.
1907. Cameron County (see Brownsville area).
1908. Camp County. 1910.
1903. Cherokee County (see Jacksonville area).
1907. Cooper area (Delta County and part of Lamar County). 1908.
1908. Corpus Christi area (part of Nueces County). 1909.
1920. Dallas County. 1924.
1907. Delta County (see Cooper area).
1918. Denton County. 1922.
1916. Eastland County. 1917.
1912. El Paso County (see Mesilla Valley area, N. Mex.).
1910. Ellis County. 1911.
1920. Erath County. 1923.
1908. Franklin County. 1909.
1918. Freestone County. 1921.
1909. Grayson County. 1910.
1906. Guadalupe County (see San Marcos area).
1912. Harrison County. 1913.
1906. Hays County (see Austin area).
1906. Hays County (see San Marcos area).
1906. Henderson area (part of Rusk County). 1907.
1905. Houston County. 1906.
1903. Jacksonville area (part of Cherokee County). 1904.
1913. Jefferson County. 1915.
1907. Lamar County (see Cooper and Paris areas).
1906. Laredo area (part of Webb County). 1908.
1905. Lavaca County. 1905.
1905. Lee County. 1906.
1917. Lubbock County. 1920.
1903. Lufkin area (part of Angelina County). 1904.
1905. McLennan County (see Waco area).
1901. Montgomery County (see Willis area).
1909. Morris County. 1910.
1903. Nacogdoches area (part of Nacogdoches County). 1904.
1903. Nacogdoches County (see Nacogdoches area).
1908. Nueces County (see Corpus Christi area).
1903. Paris area (part of Lamar County). 1904.
1919. Red River County. 1923.
1907. Robertson County. 1909.
1906. Rusk County (see Henderson area).
1904. San Antonio area (part of Bexar County). 1904.
1906. San Marcos area (parts of Bastrop Caldwell, Guadalupe, and Hays Counties). 1907.
1916. San Saba County. 1917.
1915. Smith County. 1917.
1920. Tarrant County. 1924.
1915. Taylor County. 1918.
1909. Titus County. 1910
1904. Travis County (see Austin area).
1903. Tyler County (see Woodville area).
1902. Vernon area (part of Wilbarger County). 1903.
1905. Waco area (parts of Basque and McLennan Counties). 1906.
1913. Washington County. 1915.
1906. Webb County (see Laredo area).
1902. Wilbarger County (see Vernon area).
1904. Williamson County (see Austin area).
1901. Willis area (part of Montgomery County). 1903.
1907. Wilson County. 1908.
1903. Woodville area (part of Tyler County). 1904.

Reconnaissance

1910. Central Gulf Coast Texas (Aransas, Bee, Brazoria, Calhoun, De Witt, Goliad, Jackson, Karnes, Matagorda, Refugio, Victoria, and Wharton Counties). 1911.

1919. Northwest Texas (Bailey, Cochran, Cottle, Crosby, Dickens, Floyd, Foard, Garza, Hale, Hardeman, Haskell, Hockley, Kent, King, Knox, Lamb, Lubbock, Lynn, Motley, Stonewall, Terry, and Yoakum Counties). 1922.
1910. Panhandle Texas (Armstrong, Briscoe, Carson, Castro, Childress, Collingsworth, Dallam, Deaf Smith, Donley, Gray, Hall, Hansford, Hartley, Hemphill, Hutchinson, Lipscomb, Moore, Ochiltree, Oldham, Parmer, Potter, Randall, Roberts, Sherman, Swisher, and Wheeler Counties). 1911.
1913. South Central Texas (Bandera, Blanco, Burnett, Comal, Crockett, Edwards, Gillespie, Kendall, Kerr, Kimble, Llano, Mason, Menard, Schleicher, Sutton, and Valverde Counties, and parts of Hays, Real, and Travis Counties). 1915.
1909. South Texas (Cameron, Duval, Hidalgo, Nueces, San Patricio, Starr, Webb, and Zapata Counties). 1910.
1911. Southwest Texas (Atascosa, Bexar, Dimmit, Frio, Kinney, La Salle, Live Oak, Maverick, McMullen, Medina, Uvalde, Wilson, and Zavalla Counties). 1912.

UTAH

1920. Ashley Valley area. 1921.
1904. Bear River area (part of Box Elder County). 1905.
1904. Box Elder County (see Bear River and Weber areas).
1913. Cache County (see Cache Valley area).
1913. Cache Valley area (part of Cache County). 1915.
1900. Davis County (see Weber area).
1919. Delta area (part of Millard County). 1922.
1919. Millard County (see Delta area).
1903. Provo area (part of Utah County). 1904.
1900. Sanpete County (see Sevier Valley).
1900. Sevier Valley (parts of Sanpete and Sevier Counties). 1902.
1921. Uintah River Valley area. 1925.
1903. Utah County (see Provo area).
1900. Weber area (parts of Box Elder, Davis, and Weber Counties. 1902.

VERMONT

1904. Addison County (see Vergennes area).
1904. Vergennes area (part of Addison County, Vt., and Essex County, N. Y.). 1905.
1916. Windsor County. 1918.

VIRGINIA

1917. Accomac and Northampton Counties. 1920.
1902. Albemarle area (parts of Albemarle, Buckingham, Greene, Augusta, Nelson, Page, and Rockingham Counties). 1903.
1902. Albemarle County (see Albemarle area).
1915. Alexandria County (see Fairfax and Alexandria Counties).
1901. Amelia County (see Prince Edward area).
1904. Appomattox County. 1905.
1915. Arlington County (see Alexandria and Fairfax Counties).
1902. Augusta County (see Albemarle area).
1901. Bedford area (parts of Bedford, Botetourt, Franklin, and Roanoke Counties). 1903.
1901. Bedford County (see Bedford area).
1901. Botetourt County (see Bedford area).
1902. Buckingham County (see Albemarle area).
1909. Campbell County. 1911.
1901. Charlotte County (see Prince Edward area).
1906. Chesterfield County. 1908.
1905. Elizabeth City County (see Yorktown area).
1915. Fairfax and Alexandria Counties. 1917.
1915. Fairfax County (see Fairfax and Alexandria Counties)
1901. Franklin County (see Bedford area).
1914. Frederick County. 1916.
1905. Gloucester County (see Yorktown area).
1902. Greene County (see Albemarle area).
1905. Hanover County. 1906.
1913. Henrico County. 1914.
1905. James City County (see Yorktown area).
1903. Leesburg area (parts of Loudon County, Virginia, Frederick and Washington Counties, Maryland, and Jefferson County, W. Va.). 1904.
1903. Loudon County (see Leesburg area)
1905. Louisa County. 1906.
1901. Lunenburg County (see Prince Edward area).
1907. Montgomery County. 1908.
1903. Nansemond County (see Norfolk area).
1902. Nelson County (see Albemarle area).
1903. Norfolk area (parts of Nansemond, Norfolk, and Princess Anne Counties). 1904
1903. Norfolk County (see Norfolk area).
1917. Northampton County (see Accomac and Northampton Counties).
1901. Nottoway County (see Prince Edward area).
1902. Page County (see Albemarle area).
1918. Pittsylvania County. 1922.
1903. Princess Anne County (see Norfolk area).
1901. Prince Edward County (see Prince Edward area).
1901. Prince Edward area (parts of Amelia, Charlotte, Lunenburg, Nottoway, and Prince Edward Counties). 1903.
1901. Roanoke County (see Bedford area).
1902. Rockingham County (see Albemarle area).
1905. Warwick County (see Yorktown area).
1905. York County (see Yorktown area).
1905. Yorktown area (all of Elizabeth City, Gloucester, James City, Warwick, and York Counties). 1906.

WASHINGTON

1907. Bellingham area (part of Whatcom County). 1909.
1916. Benton County. 1919.
1918. Chelan County (see Wenatchee area).
1905. Everett area (part of Snohomish County). 1906.
1914. Franklin County. 1917.
1911. Grant County (see Quincy area).
1912. Hood River-White Salmon River area, Oregon-Washington (parts of Hood River County, Oreg., and Klickitat and Skamania Counties, Wash.). 1914.
1905. Island County. 1906.
1912. Klickitat County (see Hood River area).
1911. Quincy area (part of Grant County). 1913.
1912. Skamania County (see Hood River area).
1905. Snohomish County (see Everett area).
1917. Spokane County. 1921.
1913. Stevens County. 1915.
1902. Walla Walla area (part of Walla Walla County). 1903.
1902. Walla Walla County (see Walla Walla area).
1918. Wenatchee area (part of Chelan County). 1922.
1907. Whatcom County (see Bellingham area).
1901. Yakima area (part of Yakima County). 1903.
1901. Yakima County (see Yakima area).

Reconnaissance

1909. Puget Sound Basin, eastern part, Washington (parts of King, Pierce, Skagit, Snohomish, and Whatcom Counties). 1911.
1910. Puget Sound Basin, western part, Washington (Island, Kitsap, San Juan, and Thurston Counties, and parts of Chehalis, Clallam, Jefferson, Mason, and Pierce Counties). 1912.
1911. Southwestern Washington (Clarke, Cowlitz, Pacific, and Wanklakum Counties, and parts of Lewis and Skamania Counties). 1913.

WEST VIRGINIA

1917. Barbour and Upshur Counties. 1919.
1916. Berkeley County (see Jefferson, Berkeley, and Morgan Counties).
1913. Boone County. 1915.
1918. Braxton and Clay Counties. 1920.
1906. Brooke County (see Wheeling area).
1911. Cabell County (see Huntington area).
1909. Calhoun County (see Spencer area).
1910. Clarksburg area (Harrison and Doddridge Counties). 1912.
1918. Clay County (see Braxton and Clay Counties).
1910. Doddridge County (see Clarksburg area).
1919. Fayette County. 1921.
1915. Gilmer County (see Lewis and Gilmer Counties).
1906. Hancock County (see Wheeling area).
1910. Harrison County (see Clarksburg area).
1911. Huntington area (Cabell, Lincoln, and Wayne Counties). 1912.
1910. Jackson County (see Point Pleasant area).
1916. Jefferson, Berkeley, and Morgan Counties. 1918.
1916. Jefferson County (see Jefferson, Berkeley, and Morgan Counties). 1918.
1912. Kanawha County. 1914.
1915. Lewis and Gilmer Counties. 1917.
1911. Lincoln County (see Huntington area).
1913. Logan and Mingo Counties. 1915.
1914. McDowell and Wyoming Counties. 1916.
1911. Marion County (see Morgantown area).
1906. Marshall County (see Middlebourne and Wheeling areas).
1910. Mason County (see Point Pleasant area).
1907. Middlebourne area (Marshall, Tyler, and Wetzel Counties). 1909.
1913. Mingo County (see Logan and Mingo Counties).
1911. Monongalia County (see Morgantown area).
1916. Morgan County (see Jefferson, Berkeley, and Morgan Counties).
1911. Morgantown area (Marion, Monongalia, and Taylor Counties). 1912.
1919. Nicholas County. 1922.
1906. Ohio County (see Wheeling area).
1908. Parkersburg area (Pleasants, Ritchie, and Wood Counties). 1909.
1908. Pleasants County (see Parkersburg area).
1910. Point Pleasant area (Jackson, Mason, and Putnam Counties). 1911.
1912. Preston County. 1914.
1910. Putnam County (see Point Pleasant area).
1914. Raleigh County. 1916.
1908. Ritchie County (see Parkersburg area).
1909. Roane County (see Spencer area).
1909. Spencer area (Calhoun, Roane, and Wirt Counties). 1910.
1911. Taylor County (see Morgantown area).
1921. Tucker County. 1925.
1907. Tyler County (see Middlebourne area).
1905. Upshur County (see also Barbour and Upshur Counties). 1906.
1911. Wayne County (see Huntington area).
1918. Webster County. 1920.
1907. Wetzel County (see Middlebourne area).
1906. Wheeling area (Brooke, Hancock, and Ohio Counties, and part of Marshall County). 1907.
1909. Wirt County (see Spencer area).
1908. Wood County (see Parkersburg area).
1914. Wyoming County (see McDowell and Wyoming Counties).

WISCONSIN

1920. Adams County. 1924.
1910. Ashland County (see Bayfield area).
1910. Bayfield area (parts of Bayfield and Ashland Counties). 1912.
1910. Bayfield County (see Bayfield area).
1913. Buffalo County. 1915.
1911. Columbia County. 1913.
1913. Dane County (see also Janesville area). 1915.
1916. Door County. 1918.
1904. Douglas County (see Superior area, Wisconsin, and Carlton area, Minn).
1911. Fond du Lac County. 1913.
1910. Iowa County. 1912.
1918. Jackson County. 1922.
1902. Janesville area (parts of Dane and Rock Counties). 1903.
1912. Jefferson County. 1914.
1911. Juneau County. 1913.
1919. Kenosha and Racine Counties. 1922.
1911. Kewaunee County. 1913.
1911. La Crosse County. 1913.
1916. Milwaukee County. 1918.
1903. Monroe County (see Viroqua area).
1918. Outagamie County. 1921.
1905. Portage County. 1906.
1915. Portage County. 1917.
1906. Racine County. 1907.
1919. Racine County (see Kenosha and Racine Counties).
1917. Rock County (see also Janesville area). 1920.
1904. Superior area (parts of Douglas County, Wis.; and St. Louis County, Minn.). 1905.
1903. Vernon County (see Viroqua area).
1903. Viroqua area (parts of Monroe and Vernon Counties). 1904.
1919. Walworth County. 1924.
1910. Waukesha County. 1912.
1917. Waupaca County. 1920.
1909. Waushara County. 1911.
1915. Wood County. 1917.

Reconnaissance

1909. Marinette County. 1911.
1913. Northeastern Wisconsin (Florence, Forest, Langlade, Marinette, Oconto and Shawano Counties). 1915.
1914. North part north-central Wisconsin (Iron, Oneida, Price and Vilas Counties, and parts of Ashland and Rusk Counties). 1916.
1915. South part north-central Wisconsin (Clark, Lincoln, Marathon, and Taylor Counties). 1917.

WYOMING

1903. Albany County (see Laramie area).
1917. Fort Laramie area (parts of Goshen County, Wyo., and Scotts Bluff County, Nebr.). 1921.
1917. Goshen County (see Fort Laramie area).
1903. Laramie area (part of Albany County). 1904.

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List of soil types established by the Division of Soils in 1899 and 1900, with brief description. Milton Whitney. 1901.
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Catalogue of Texas, Alabama, South Carolina, and Ohio grown tobacco. 1904.
List of publications. October, 1904; March, 1905; March, 1906; April, 1907; February, 1909.
Instructions to field parties, and description of soil types: Field season, 1904. 1904. Revised, 1906. Title: Soil survey field book. Field season, 1906. 1906. Revised, 1914. Title: Instructions to field parties.
Assignment of field parties. Milton Whitney. December, 1905. Revised, January 13, 1906; February 13, 1906; March 15, 1906.
Authorizations. (Assignments of field parties.) Milton Whitney. 1906. Revised, 1907.
List of soil surveys. 1907; 1908; 1909; 1910; 1911; 1912; 1913; 1914; 1915; 1917.
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Descriptions of soil types established and changes in classification since the publication of Bureau of Soils Bulletin 78. 1911.
Important soils of the United States. 1916.

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1916. A. C. True.
1917. A. C. True.
1918. A. C. True.
1919. A. C. True.
1920. A. C. True.
1921. A. C. True.
1922. A. C. True.
1923. A. C. True.

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1. Boys' and girls' club work: Suggestions for club meetings and programs. 1915.
2. A model constitution for boys' and girls' clubs, with suggestions for parliamentary procedure. 1915.
4. Address list of agricultural experiment stations in the United States. 1915. Revised, 1917.
5. Address list of agricultural and mechanical colleges in the United States. 1915. Revised, 1917.
7. Suggestions No. 4 to club leaders and demonstrators in home canning club projects. O. H. Benson. 1915. Revised, 1916. Title: Suggestions and information for canning demonstrators. O. H. Benson. Revised, 1917.
8. Potato starch and its use in the home. O. H. Benson. 1915.
9. Home canning instructions: Canning of soups and meats. George E. Farrell. 1915.
10. Boys' and girls' club work: Hints to potato growers. George E. Farrell. 1915.

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11. Boys' and girls' club work: Tinning, capping, and soldering cans. O. H. Benson. 1915.
12. Additional receipts, tested and determined, for use in the boys' and girls' home canning club work. George E. Farrell. 1916. Revised, 1917. Title: Home canning instructions—additional recipes. George E. Farrell.
13. Address list of State institutions and officers in charge of agricultural extension work. October 1, 1917.
15. Boys' and girls' club work: Canning windfall and cull apples and use of by-products. O. H. Benson. 1915. Revised, 1917. Title: Utilizing windfall and cull apples and apple by-products.
16. Boys' and girls' club work: Receipts for the use of potatoes and homemade potato starch. Marie Willoughby Rogers. 1915.
17. Boys' and girls' club work: Home canning club instructions to save fruit and vegetable waste. O. H. Benson. 1915. Revised, 1917. Title: Classification of fruits and vegetables for club canning. O. H. Benson.
18. Home canning instructions. O. H. Benson. 1915. Revised, 1917.
19. Mother-daughter home canning club and vacation canning club: Project report (blank form). George E. Farrell. 1915. Revised, 1917. Title: Mother-daughter home canning clubs (blank form).
20. Suggestions for organization of mother-daughter home canning clubs. O. H. Benson. 1915. Revised, 1917. Title: The mother-daughter home canning club. O. H. Benson. 1917.
21. Apple club project: Crop report (blank form). George E. Farrell.
22. Canning, preserving, pickling. Mary E. Creswell and Ola Powell. 1916.
24. Suggestions No. 3—Boys' and girls' club agents, State, district, and county. O. H. Benson. 1915.
25. 4-H brand seed corn labels. O. H. Benson.
26. Farm and home handicraft clubs. O. H. Benson. 1915.
27. Organization of boys' agricultural club work in the Southern States. O. B. Martin and I. W. Hill. 1915. Revised, 1918. Title: Boys' agricultural club work in the Southern States. I. W. Hill and C. L. Chambers.
28. Canning club and home demonstration work. O. B. Martin and Mary E. Creswell. 1915.
29. Development of the boys' club work. O. B. Martin. 1915.
30. Farm manures and fertilizers. W. B. Mercier and H. E. Savely. 1916.
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32. Status and results of county agricultural agent work in the Northern and Western States, 1915. W. A. Lloyd. 1916.
33. Boys' and girls' club work. Common home canning difficulties and how to avoid them. O. H. Benson and George E. Farrell. 1916. Revised, 1917. Title: Some home canning difficulties and how to avoid them. O. H. Benson and George E. Farrell.
34. Office filing system for county agricultural agents in the Northern and Western States. H. B. Fuller. 1917. Revised, 1918.
35. Boys' and girls' club work. Home canning club aprons and caps. A. H. Whittelsey. 1917.
36. Methods of growing cotton under boll weevil conditions. 1917.
37. Key to subject index of experiment station literature. Revised December 1, 1916, 1917; January 1, 1918. 1918.
38. Farm records and accounts. Suggestions for teaching the subject in secondary schools. H. P. Barrows. 1917.
39. Peppers. Ola Powell and Mary E. Creswell. 1917.
40. Cooperative agricultural extension work. Organization and finances. 1917. Revised, 1918; 1919.
41. An effective method of preventing the erosion of hill lands. W. B. Mercier. 1917.
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43. Soy beans in the Cotton Belt. W. J. Morse. 1917.
44. Velvet beans. C. V. Piper. 1917.
45. Peanut growing in the Cotton Belt. H. C. Thompson. 1917.
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50. Food requirements of the human body: Suggestions for teachers in secondary schools. 1917.
51. A method of mapping, charting, and recording county-agent work. L. R. Simons. 1917.
52. Boys' and girls' club work: Home gardens. Insects and diseases of vegetables and how to combat them. C. P. Close. 1917.
53. Boys' and girls' club work: Suggestions to local leaders in poultry-club work. George E. Farrell. 1917.
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56. Boys' and girls' club work: Common poultry diseases. 1917.
57. Raising ducks, geese, and turkeys: Suggestions for teachers in secondary schools. H. P. Barrows. 1917.
58. Types and breeds of farm animals: Suggestions for teachers in secondary schools. H. P. Barrows. 1917.
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60. County agricultural agent work in the Northern and Western States: Status and results in 1916. W. A. Lloyd. 1917.
61. Boys' and girls' club work: Feeding and housing winter layers. Animal Husbandry Division, Bureau of Animal Industry. 1917.
62. Home floriculture and home-ground improvement: Suggestions for teachers in secondary schools. H. P. Barrows. 1917.
63. The propagation and pruning of plants: Suggestions for teachers in secondary schools. H. P. Barrows. 1917.
64. Partial substitutes for wheat in bread making. Hannah L. Wessling. 1917.
65. Handbook on farm-bureau organization for county agricultural agents. L. R. Simons. 1917.
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68. Boys' and girls' club work: How to set a hen and care for her. 1917.
69. Boys' and girls' club work: Care and feeding of chicks. 1917.
70. Boys' and girls' club work: How to build a brood coop for hen and chicks. 1918.
71. Boys' and girls' club work: Poultry mites and lice. 1918.
72. Marketing farm products: Suggestions for teachers in secondary schools. H. P. Barrows. 1917.
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76. Instruction in sheep and goat husbandry: Suggestions for teachers in secondary schools. H. P. Barrows. 1918.
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79. Capons and caponizing. 1918.
80. Home canning of meats and sea foods with the steam-pressure canner. Franz P. Lund. 1918. Revised, 1919.
81. Beef production: Suggestions for teachers in secondary schools. H. P. Barrows. 1918.
82. Safe farming and what it means for the South in 1918. Bradford Knapp. 1918.
83. Sewing for girls' club work. 1918.
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85. The card index of experiment station literature. (Outline of plan of procedure.) 1918.
86. Boys' and girls' club work: Selection, preparation, and planting of the potato plat. W. Stuart and H. B. Hendrick. 1918.
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89. Organization of a county for extension work: The farm-bureau plan. L. R. Simons. 1919.
90. Cooperative extension work in agriculture and home economics. 1918.
91. Use of poultry club products. 1919.
92. Gardening instructions for club members. 1919.
93. Berry culture. 1919.
94. Currant and gooseberry culture. 1919.
95. Insect enemies and diseases of the tomato. F. H. Chittenden. 1919.
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97. Boys' and girls' club work: Directions for home canning in tin and mechanical sealing. O. H. Benson and George E. Farrell. 1919.
98. Boys' and girls' club work: Tomato growing for club work. W. R. Beattie. 1919.
99. Making vinegar in the home. 1919.

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How teachers in rural elementary schools may use Farmers' Bulletin 602: Clean milk—Production and handling. Alvin Dille. 1919. (Department Circular 67.)
How teachers in rural elementary schools may use Farmers' Bulletin 642: Tomato growing in the South. E. A. Miller. 1917.
How teachers of rural elementary schools may use Farmers' Bulletin 660: Weeds—How to control them. F. E. Heald. 1917.
How teachers may use Farmers' Bulletin No. 687: Eradication of ferns from pasture lands. F. E. Heald. 1916.
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How teachers in rural elementary schools may use Farmers' Bulletin 711: The care and improvement of the wood lot. F. E. Heald. 1917.
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How teachers may use Farmers' Bulletin 1148: Cowpeas—Culture and varieties. F. A. Merrill. 1921. (Department Circular 157.)
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How teachers in rural elementary schools may use a soil survey. C. H. Lane. 1917
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How teachers in rural elementary schools may use department publications on home storage of fruits and vegetables. Alvin Dille. 1918.
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1916. C. C. Georgeson, G. W. Gasser, J. W. Neal, and M. D. Snodgrass. 1918.
1917. C. C. Georgeson, G. W. Gasser, M. D. Snodgrass, Hiram E. Pratt, and F. E. Rader. 1919.
1918. C. C. Georgeson, C. H. Benson, G. W. Gasser, M. D. Snodgrass, F. E. Rader, and H. E. Pratt. 1920.
1919. C. C. Georgeson, C. H. Benson, G. W. Gasser, M. D. Snodgrass, W. T. White, and F. E. Rader. 1920.
1920. C. C. Georgeson, G. W. Gasser, M. D. Snodgrass, F. E. Rader, and W. T. White. 1922.
1921. C. C. Georgeson, H. Lindberg, F. E. Rader, G. W. Gasser, C. S. Hahn, and W. T. White. 1923.
1922. C. C. Georgeson. 1923.
1923. C. C. Georgeson. 1925.

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4. Production of improved hardy strawberries for Alaska. C. C. Georgeson. 1923.
5. Eradication of tuberculosis in cattle at the Kodiak Experiment Station. C. C. Georgeson and W. T. White. 1924.

GUAM EXPERIMENT STATION

ANNUAL REPORTS

1916. A. C. Hartenbower, J. Barbour, and L. R. Barber. 1917.
1917. C. W. Edwards and Glen Briggs. 1918.
1918. C. W. Edwards, Glen Briggs, and P. Nelson. 1919.
1919. C. W. Edwards, Glen Briggs, W. J. Green, and P. Nelson. 1921.
1920. C. W. Edwards, Glen Briggs, W. T. Green, and P. Nelson. 1921.
1921. C. W. Edwards, Joaquin Guerrero, W. J. Green, and P. Nelson. 1923.
1922. C. W. Edwards and Joaquin Guerrero. 1924.
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1. Para and paspalum: Two introduced grasses of Guam. Glen Briggs. 1921.
2. Vegetable growing in Guam. Glen Briggs. 1922.
3. The sorghum in Guam. Glen Briggs. 1922.
4. Leguminous crops for Guam. Glen Briggs. 1922.

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1. Para and paspalum grasses. Glen Briggs. 1921.

EXTENSION CIRCULARS

1. Plans for boys' and girls' agricultural clubs for 1921. W. J. Green. 1920.
2. The home garden for club members. Glen Briggs. 1921.
3. Corn growing in Guam for club members. W. J. Green. 1923.

HAWAII EXPERIMENT STATION

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1916. J. M. Westgate, J. E. Higgins, Maxwell O. Johnson, C. W. Carpenter, C. A. Sahr, F. G. Krauss, J. R. Thompson, and A. T. Longley. 1917.
1917. J. M. Westgate, J. Edgar Higgins, Maxwell O. Johnson, F. G. Krauss, C. W. Carpenter, J. R. Thompson, C. A. Sahr, A. T. Longley. 1918.
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1919. J. M. Westgate, J. Edgar Higgins, Maxwell O. Johnson, Kim A. Ching, H. L. Chung, C. W. Carpenter, L. M. Ross, F. G. Krauss, and R. A. Goff. 1920.
1920. J. M. Westgate, Wallace Macfarlane, H. L. Chung, Kim A. Ching, C. W. Carpenter, F. G. Krauss, and R. A. Goff. 1921.
1921. J. M. Westgate, W. T. Pope, H. L. Chung, J. C. Ripperton, F. G. Krauss, Mrs. N. A. Russell, R. A. Goff. 1922.
1922. J. M. Westgate, W. T. Pope, H. L. Chung, J. C. Ripperton, R. A. Goff, Mrs. N. A. Russell, F. G. Krauss, and J. F. O'Brien. 1924.
1923. J. M. Westgate, W. T. Pope, H. L. Chung, J. C. Ripperton, R. A. Goff, H. F. Willey, Mrs. Nellie A. Russell, and Mabel Greene. 1924.

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39. The biochemical decomposition of nitrogenous substances in soils. W. P. Kelley. 1915.
40. The soils of the Hawaiian Islands. W. P. Kelley, W. T. McGeorge, and Alice R. Thompson. 1915.
41. Phosphate fertilizers for Hawaiian soils, and their availability. W. T. McGeorge. 1916.
42. Composition of Hawaiian soil particles. W. T. McGeorge. 1917.
43. Chemical studies of the efficiency of legumes as green manures in Hawaii. Alice R. Thompson. 1917.
44. The litchi in Hawaii. J. E. Higgins. 1917.
45. Potato diseases in Hawaii and their control. C. W. Carpenter. 1920.
46. The pigeon pea (*Cajanus indicus*), its culture and utilization in Hawaii. F. G. Krauss. 1921.
47. Application of the principles of jelly making to Hawaiian fruits. J. C. Ripperton. 1923.
48. Swine raising in Hawaii. F. G. Krauss. 1923.

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1. Extension notes—I. 1917.
2. Extension notes—II. 1917.
3. Emergency series—I. Field production of beans. 1917.
4. Emergency series—II. Methods of combating garden pests. C. W. Carpenter. 1917.
5. Emergency series—III. Peanuts: How to grow them. F. G. Krauss. 1917.
6. Emergency series—IV. The banana as an emergency food crop. J. E. Higgins. 1917.
7. Emergency series—V. Frying as a method of food preservation in Hawaii. Maxwell O. Johnson. 1918.
8. Emergency series—VI. Bean spot disease. C. W. Carpenter. 1918.

PORTO RICO EXPERIMENT STATION

ANNUAL REPORTS

1916. D. W. May, P. L. Gile, J. O. Carrero, C. F. Kinman, T. B. McClelland, R. H. Van Zwaluwenburg, and E. W. Brandes. 1918.
1917. D. W. May, P. L. Gile, J. O. Carrero, C. F. Kinman, T. B. McClelland, H. E. Thomas, L. R. Hesler, R. H. Van Zwaluwenburg, W. P. Snyder, H. C. Henricksen, and W. A. Mace. 1918.
1918. D. W. May, T. B. McClelland, W. V. Tower, J. O. Carrero, W. P. Snyder, H. C. Henricksen, and W. A. Mace. 1920.
1919. D. W. May, L. G. Willis, J. O. Carrero, T. B. McClelland, W. V. Tower, W. P. Snyder, H. C. Henricksen, and W. A. Mace. 1920.
1920. D. W. May, L. G. Willis, J. O. Carrero, T. B. McClelland, J. P. Griffith, W. V. Tower, H. C. Henricksen, and W. A. Mace. 1921.
1921. D. W. May, L. G. Willis, J. O. Carrero, T. B. McClelland, Thomas Bregger, W. P. Snyder, J. A. Saldaña, W. V. Tower, and H. C. Henricksen. 1922.
1922. D. W. May, L. G. Willis, J. O. Carrero, T. B. McClelland, Thomas Bregger, W. P. Snyder, J. A. Saldaña, W. V. Tower, H. C. Henricksen, and C. M. Tucker. 1923.
1923. D. W. May, J. O. Carrero, T. B. McClelland, Thomas Bregger, W. P. Snyder, J. A. Saldaña, W. V. Tower, C. M. Tucker, and H. C. Henricksen. 1924.

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19. Cover crops for Porto Rico. C. F. Kinman. 1916. Also Spanish edition.
20. Experiments on the supposed deterioration of varieties of vegetables in Porto Rico, with suggestions for seed preservation. C. F. Kinman and T. B. McClelland. 1916. Also Spanish edition.
21. Some profitable and unprofitable coffee lands. T. B. McClelland. 1917. Also Spanish edition.
22. Effect of different methods of transplanting coffee. T. B. McClelland. 1917. Also Spanish edition.
23. The changa or West Indian mole cricket. R. H. Van Zwaluwenburg. 1918.
24. The mango in Porto Rico. C. F. Kinman. 1918.
25. The bat guanos of Porto Rico and their fertilizing value. P. L. Gile and J. O. Carrero. 1918.
26. Vanilla: A promising new crop for Porto Rico. T. B. McClelland. 1919.
27. Yam culture in Porto Rico. C. F. Kinman. 1921.

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28. The coffee leaf spot (*Stilbella flavida*) in Porto Rico. T. B. McClelland. 1921. Also Spanish edition.
29. Dairying in Porto Rico. D. W. May. 1922. Also Spanish edition.

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16. Rearing queen bees in Porto Rico. R. H. Van Zwaluwenburg and Rafael Vidal. 1918. Also Spanish edition.
17. Some means of controlling insects, fungi, and other pests in Porto Rico. R. H. Van Zwaluwenburg and H. E. Thomas. 1918.
17. The selection of seed corn in Porto Rico. H. C. Henricksen. 1920.
19. Poultry keeping in Porto Rico. H. C. Henricksen. 1921. Also Spanish edition.
20. Mosquito survey of Mayagnez. W. V. Tower. 1921.

VIRGIN ISLANDS EXPERIMENT STATION

ANNUAL REPORTS

1919. Longfield Smith. 1920.
1920. Longfield Smith and C. E. Wilson. 1921.
1921. Longfield Smith and C. E. Wilson. 1922.
1922. J. B. Thompson and C. E. Wilson. 1923.
1923. J. B. Thompson and W. M. Perry. 1924.

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1. Sea-Island cotton in St. Croix. Longfield Smith. 1921.
2. Sugar cane in St. Croix. Longfield Smith. 1921.
3. Insect pests of cotton in St. Croix and means of combating them. Charles E. Wilson. 1923
4. Truck crop insect pests in the Virgin Islands and methods of combating them. Charles E. Wilson. 1923.

REPORT ON THE RECEIPTS, EXPENDITURES, AND RESULTS IN EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS IN THE UNITED STATES

1915. A. C. True.
1916. A. C. True.
1917. A. C. True.
1918. A. C. True.
1919. A. C. True.
1920. A. C. True.
1921. A. C. True.
1922. A. C. True.

For later reports see Office of the Secretary, Extension Service, Cooperative extension work.

SYLLABUSES

17. Illustrated lecture on the production of poultry and eggs on the farm. Harry M. Lamon. 1915.
18. Illustrated lecture on the production of clean milk. 1915.
19. Illustrated lecture on how to make good farm butter. J. H. McClain. 1916.
20. Illustrated lecture on the production of alfalfa east of the ninety-fifth meridian. H. L. Westover and H. B. Hendrick. 1916.
21. Illustrated lecture on corn production. C. P. Hartley and H. B. Hendrick. 1916.
22. Illustrated lecture on cattle-tick eradication. 1916.
23. Illustrated lecture on orchard management. H. M. Conolly and E. J. Glasson. 1916.
24. Illustrated lecture on leguminous forage crops for the South. Charles V. Piper and H. B. Hendrick. 1917.
25. Illustrated lecture on leguminous forage crops for the North. Charles V. Piper and H. B. Hendrick. 1917.
26. Illustrated lecture on sweet potatoes: Culture and storage. H. M. Conolly. 1917.
27. Illustrated lecture on the farm vegetable garden. H. C. Thompson and H. M. Conolly. 1917.
28. Illustrated lecture on practical improvement of farm grounds. F. L. Mulford and H. M. Conolly. 1917.
29. Illustrated lecture on public-road improvement. 1917.
30. Illustrated lecture on cow testing and dairy records. Duncan Stuart. 1917.
31. Illustrated lecture on renovating the neglected apple orchard. H. M. Conolly. 1918.
32. Illustrated lecture on growing and handling Irish potatoes. William Stuart and H. B. Hendrick. 1918.
33. Illustrated lecture on the city and suburban vegetable garden. H. M. Conolly. 1918.
34. Illustrated lecture on green manuring. A. J. Pieters. 1918.
35. Illustrated lecture on soy beans. W. J. Morse and H. B. Hendrick. 1919.

For earlier issues see Office of Experiment Stations, Farmers' Institute Lectures.
See also Office of Experiment Stations.

UNNUMBERED PUBLICATIONS

Boys' and girls' club work. Corn. (Blank form.) 1915.
Suggestions and instructions for home canning club demonstrations. O. H. Benson. 1915.
Five little pigs and how four made money for farm boys and girls. 1917. (?)
How a county agent obtained farm labor from towns. Thomas B. Symons. 1918.
Save wheat: Use wheat substitutes. 1918.
Boys and girls livestock record book (blank forms). 1920.
Statistics of cooperative extension work, 1919–1920. 1920.
Education and research in agriculture and home economics in the United States, supplementing exhibit of the States Relations Service, United States Department of Agriculture, at the Brazil Centennial Exposition, Rio de Janeiro, Brazil, 1922–1923. A. C. True. 1922. Also Spanish and Portuguese editions.

WORK AND EXPENDITURES OF THE AGRICULTURAL EXPERIMENT STATIONS

1915. Issued in 1917.
1916. Issued in 1918.
1917. Issued in 1918.
1918. Issued in 1920.
1919. Issued in 1921.
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1921. Issued in 1923.
1922. Issued in 1924.
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BUREAU OF STATISTICS AND CROP ESTIMATES[84]

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1901. John Hyde.
1902. John Hyde.
1903. Edwin S. Holmes, jr.
1904. John Hyde.
1905. W. M. Hays.
1906. Victor H. Olmstead.
1907. C. C. Clark.
1908. C. C. Clark.
1909. Victor H. Olmstead.
1910. Victor H. Olmstead.
1911. Victor H. Olmstead.
1912. Victor H. Olmstead.
1913. Nat C. Murray.
1914. Leon M. Estabrook.

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18. The course of prices of farm implements and machinery for a series of years. George K. Holmes. 1901.
19. The cotton crop of 1899–1900. James L. Watkins. 1901.
20. Wheat growing and general agricultural conditions in the Pacific coast region of the United States. Edwin S. Holmes, jr. 1901.
21. Rates of charge for transporting garden truck, with notes on the growth of the industry. Edward G. Ward, jr., and Edwin S. Holmes, jr. 1901.
22. Wages of farm labor in the United States: Results of 11 statistical investigations, 1866–1899. 1901.
23. Statistics on the fruit industry of California. Edwin S. Holmes, jr. 1901.
24. Relations of population and food products in the United States, exclusive of Alaska and insular possessions; mainly as indicated by census reports, 1850–1900. James H. Blodgett. 1903.
25. Milk transportation: Freight rates to the largest 15 cities in the United States. Edward G. Ward, jr. 1903.
26. Wages of farm labor in the United States: Results of 12 statistical investigations 1866–1902. James H. Blodgett. 1903.
27. Wheat production and farm life in Argentina. Frank W. Bicknell. 1904.
28. The commercial cotton crops of 1900–1901, 1901–1902, and 1902–1903. James L. Watkins. 1904.
29. Methods and routes for exporting farm products. Edward G. Ward, jr. 1904.
30. International sugar situation: Origin of the sugar problem and its present aspects under the Brussels convention. Frank R. Rutter. 1904.
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33. Trade with noncontiguous possessions in farm and forest products, 1901–1903. 1905.
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36. Exports of farm and forest products, 1902–1904, by countries to which consigned. 1905.
37. Trade with noncontiguous possessions in farm and forest products, 1902–1904. 1905.
38. Crop export movement and port facilities on the Atlantic and Gulf coasts. Frank Andrews. 1905.
39. Meat in foreign markets, tariffs of 14 importing nations, and countries of surplus. 1905.
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41. Norway, Sweden, and Russia as markets for packing-house products. Imports from principal countries, 1895–1904. 1906.
42. Russia's wheat surplus: Conditions under which it is produced. I. M. Rubinow. 1906.
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46. Exports of farm and forest products, 1903–1905, by countries to which consigned. 1906.
47. Trade with noncontiguous possessions in farm and forest products, 1903–1905. 1906.
48. The cost of producing farm products. Willet M. Hays and Edward C. Parker. 1906.
49. Costs of hauling crops from farms to shipping points. Frank Andrews. 1907.
50. Hops in principal countries: Their supply, foreign trade, and consumption, with statistics of beer brewing. Eugene Merritt. 1907.
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52. Imports of farm and forest products, 1904–1906, by countries from which consigned. 1907.

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[84] Known as the Division of Statistics prior to July 1, 1903; as the Bureau of Statistics July 1, 1903, to July 1, 1913; as the Bureau of Statistics and Crop Estimates July 1, 1913, to July 1, 1914; as the Bureau of Crop Estimates July 1, 1914, to July 1, 1921; as Bureau of Markets and Crop Estimates July 1, 1921, to July 1, 1922.
See also Bureau of Agricultural Economics.

53. Exports of farm and forest products, 1904–1906, by countries to which consigned. 1907.
54. Trade with noncontiguous possessions in farm and forest products, 1904–1906. 1907.
55. Meat supply and surplus, with consideration of consumption and exports. George K. Holmes. 1907.
56. Corn crops of the United States, 1866–1906. 1907.
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58. Oat crops of the United States, 1866–1906. 1907.
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60. Rye crops of the United States, 1866–1906. 1908.
61. Buckwheat crops of the United States, 1866–1906. 1908.
62. Potato crops of the United States, 1866–1906. 1908.
63. Hay crops of the United States, 1866–1906. 1908.
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66. Russian wheat and wheat flour in European markets. I. M. Rubinow. 1908.
67. Ocean freight rates and the conditions affecting them. Frank Andrews. 1907.
68. Cereal production of Europe. Frank R. Rutter. 1908.
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73. The cost of producing Minnesota farm products, 1902–1907. Edward C. Parker and Thomas P. Cooper. 1909.
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78. Agricultural graphics: United States and world crops and livestock. Middleton Smith. 1910.
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81. Grain movement in the Great Lakes region. Frank Andrews. 1910.
82. Imports of farm and forest products, 1907–1909, by countries from which consigned. 1910.
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85. Seedtime and harvest: Cereals, flax, cotton, and tobacco. Dates of planting and harvesting east of the meridians 102–104, in the United States. James R. Covert. 1912.
86. Not published.
87. Not published.
88. The cost of producing Minnesota dairy products, 1904–1909. Thomas P. Cooper. 1911.
89. Marketing grain and livestock in the Pacific coast region. Frank Andrews. 1911.
90. Imports of farm and forest products, 1908–1910, by countries from which consigned. 1911.
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92. Not published.
93. Cold-storage business features: Reports of warehouses. George K. Holmes. 1913.
94. Supply of farm labor. George K. Holmes. 1912.
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96. Exports of farm and forest products, 1909–1911, by countries to which consigned. 1912.
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98. Not published.
99. Wages of farm labor: Nineteenth investigation, in 1909, continuing a series that began in 1866. George K. Holmes. 1912.
100. Railroads and farming: Some influences affecting the progress of agriculture. Frank Andrews. 1912.
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102. List of agricultural fairs and exhibitions in the United States. George K. Holmes. 1913.
103. International trade in farm and forest products, 1901–1910. Revision by Eugene Merritt. 1913.

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14. Estimates of Russian crops. 1901.
15. Foreign trade in farm and forest products, 1903. 1903.
16. Foreign trade in farm and forest products, 1904. 1905.
17. Government crop reports: Their value, scope, and preparation. Chas. C. Clark. 1908. Revised, 1911; 1915.
18. Tobacco districts and types. J. P. Killebrew. 1909.
19. Foreign crops, May, 1911. Charles M. Daugherty. 1911.
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23. Foreign crops, August, 1911. Charles M. Daugherty. 1911.
24. Foreign crops, September, 1911. Charles M. Daugherty. 1911.
25. Foreign crops, October, 1911. Charles M. Daugherty. 1911.

26. Foreign crops, November–December, 1911. Charles M. Daugherty. 1912.
27. Tobacco crop, 1911, by types and districts. J. P. Killebrew. 1912.
28. Foreign crops, January, 1912. Charles M. Daugherty. 1912.
29. Foreign crops summary: Area and production of cereals, 1907–1911, and of flaxseed, 1908–1910, by countries. Charles M. Daugherty. 1912.
30. Foreign crops, March, 1912 (Argentina). Charles M. Daugherty. 1912.
31. Annual and average production of and international trade in important agricultural products, by countries. Royal T. McKenna. 1912.
32. Cotton crop of the United States, 1790–1911. 1912.
33. Tobacco crop of the United States, 1612–1911. 1912.
34. Rice crop of the United States, 1712–1911. 1912.
35. Hog crop of the United States, 1790–1911. 1912.
36. Foreign crops, April, 1912 (British India). Harry C. Graham. 1912.
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38. Tobacco report, July 1, 1912. J. P. Killebrew. 1912.
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41. Foreign crops, October, 1912. Charles M. Daugherty. 1912.
42. Foreign crops, November, 1912. Charles M. Daugherty. 1912.
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45. Foreign crops: January. Summary, by countries, of the area and production of cereals, 1908–1912, and of flaxseed, 1909–1911. Charles M. Daugherty. 1913.
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Orders governing the preparation of monthly crop reports of the Bureau of Statistics. Revised 1909; 1911.
Field agents handbook of agricultural statistics. 1914.

DIVISION OF VEGETABLE PHYSIOLOGY AND PATHOLOGY[9]

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28. The cultural characters of *Pseudomonas hyacinthi*, *Ps. campestris*, *Ps. phaseoli*, and *Ps. stewarti*—Four one-flagellate yellow bacteria parasitic on plants. Irwin F. Smith. 1901.
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18. A new wheat industry for the semiarid West. Mark Alfred Carleton. 1901.

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ABSTRACT OF DATA

1. Precipitation in the Panhandle region of Texas. (No date.)
2. Precipitation in western Kansas. (1907.)
3. Annual precipitation of the United States for the years 1872 to 1907. (1908.)
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1902. Willis L. Moore.
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1911. Willis L. Moore.
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1913. C. F. Marvin.
1914. C. F. Marvin.
1915. C. F. Marvin.
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1918. C. F. Marvin.
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BULLETINS

30. Loss of life in the United States by lightning. Alfred J. Henry. 1901.
31. Proceedings of the second convention of Weather Bureau officials, Milwaukee, Wis., August 27–29, 1901.
32. Hurricanes: Especially those of Porto Rico and St. Kitts. William H. Alexander. 1902.
33. Weather folk-lore and local weather signs. Edward B. Garriott. 1903.
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35. Long-range weather forecasts. E. B. Garriott. 1904.

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36. A first report on the relations between climates and crops. Cleveland Abbe. 1905.
37. Recent practice in the erection of lightning conductors. Alfred J. Henry. 1906.
38. Mississippi River levees and their effect on river States during flood periods. Samuel C. Emery. 1910.
39. A course in meteorology and physical geography. W. N. Allen. 1911.
40. The relation between the precipitation over the watershed of the Ohio River above and the stream-flow at Cincinnati. J. Warren Smith. 1911.
41. Forecasting frost in the North Pacific States. Edward A. Beals. 1912.
42. Forecasting the weather. George S. Bliss. 1913. Second edition, 1917. Third edition, 1921. Fourth edition, 1925.
43. The rivers and floods of the Sacramento and San Joaquin watersheds. Nathaniel R. Taylor. 1913.
44. The climate of San Francisco. Alexander G. McAdie. 1913.

BULLETINS (LETTERED SERIES)

I. Eclipse meteorology and allied problems. Frank H. Bigelow. 1902.
J. Wind velocity and fluctuations of water level on Lake Erie. Alfred J. Henry. 1902.
K. Storms of the Great Lakes. E. B. Garriott. 1903.
L. Climatology of California. Alexander G. McAdie. 1903.
M. The floods of the spring of 1903 in the Mississippi watershed. H. C. Frankenfield. 1904.
N. Periodic variation of rainfall in the arid regions. William B. Stockman. 1905.
O. Temperature and relative humidity data. William B. Stockman. 1905.
P. Cold waves and frost in the United States. Edward B. Garriott. 1906.
Q. Climatology of the United States. Alfred Judson Henry. 1906.
R. The daily normal temperature and the daily normal precipitation of the United States. Frank Hagar Bigelow. 1908.
S. Report on the temperatures and vapor tensions of the United States reduced to a homogeneous system of 24 hourly observations for the 33-year interval, 1873–1905. Frank H. Bigelow. 1909.
T. Frost and temperature conditions in the cranberry marshes of Wisconsin. Henry J. Cox. 1910.
U. Temperature departures, monthly and annual, in the United States. January, 1873, to June, 1909, inclusive. 1911.
V. Frost data of the United States, and length of the crop-growing season, as determined from the average of the latest and earliest dates of killing frost. P. C. Day. 1911.
W. Summaries of climatological data by sections. 1912.
X. Hurricanes of the West Indies. Oliver L. Fassig. 1913.
Y. The Ohio and Mississippi floods of 1912. H. C. Frankenfield. 1913.
Z. The floods of 1913 in the rivers of the Ohio and lower Mississippi Valleys. Alfred J. Henry. 1913.

DAILY RIVER STAGES

Daily river stages at river gauge stations on the principal rivers of the United States. Part VII. 1900–1904. H. C. Frankenfield. 1905.
———. Part VIII. 1905–1906. H. C. Frankenfield. 1909.
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———. Part X. 1909–1910. H. C. Frankenfield. 1911.
———. Part XI. 1911–1912. Alfred J. Henry. 1913.
———. Part XII. 1913–1914. Alfred J. Henry. 1915.
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———. Part XIV. 1916. Alfred J. Henry. 1917.
———. Part XV. 1917. Alfred J. Henry. 1918.
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———. Part XVIII. 1920. H. C. Frankenfield. 1922.
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INSTRUMENT DIVISION

CIRCULARS

I. Instructions for erecting and using Weather Bureau nephoscope. 1920.
J. Instructions for the installation and maintenance of Marvin water-stage registers with specifications. 1921.
K. Instructions for aerial observers. C. F. Marvin. 1898.
L. Instructions for the installation and operation of class "A" evaporation stations. Benjamin C. Kadel. 1915. Revised, 1919.
M. Instructions to marine meteorological observers. Fourth edition. 1925. (Letter assigned with fourth edition.)

UNNUMBERED PUBLICATIONS

Instructions governing the corn, wheat, cotton, and sugar and rice regions service. Second edition. Second edition, 1904. Third edition, 1912. Fourth edition, 1918.
Tables for dividing by 12, 24, 28, 29, 31, 56, 58, 60, 62, 672, 696, 720, 744, and 8,760 and percentage tables for divisors 8 to 16.5, inclusive. 1903.
Climatic chart of the United States: Part I. Six Washington daily weather maps, for the dates February 1–6, 1903, inclusive, showing the movement of a typical storm, with full explanation of symbols, etc. Part II. Five charts, normal precipitation. Part III. Three charts, normal sunshine. Part IV. Three charts, normal barometric pressure. Part V. Three charts, normal temperature of the air at the surface of the earth. Part VI. Six charts, temperature, 1904. 1904.
Instructions to special river and rainfall observers of the Weather Bureau. 1904. Revised 1909; 1912, by H. C. Frankenfield; 1915, by Alfred J. Henry; 1916; 1924, by H. C. Frankenfield.

Proceedings of the third convention of Weather Bureau officials, held at Peoria, Ill., September 20–22, 1904. 1904.
Synopses of papers to be read and also extracts from reports pertaining to meteorology in universities and other institutions, Peoria, Ill., September 20–22, 1904.
The Weather Bureau. 1901. Revised, 1904; 1906; 1910; 1912; 1913, Henry E. Williams; 1915, Henry E. Williams; 1916, Henry E. Williams; 1923, E. V. Calvert.
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Sunshine tables: Parts I, II, and III. C. F. Marvin. 1905.
Instructions for voluntary observers. 1901. Second edition. (Circular B–C.) Later editions have title: "Instructions for cooperative observers."
Instructions for cooperative observers. 1906. Third edition. (Circulars B and C, Instrument Division.) Fourth edition, 1911. Fifth edition, 1915. Sixth edition, 1919. Seventh edition, 1924.
Weather code. 1907. (Revised.)
The daily weather map with explanation. 1908.
A manual for observers in climatology and evaporation. Frank Hagar Bigelow. 1909.
Climatic charts for the United States, showing the lowest temperatures ever observed at the regular Weather Bureau and selected cooperative stations, the highest temperatures ever observed, the normal annual precipitation in the United States, 1870–1901, the annual sunshine, the normal temperature of the air at the surface of the earth. Several editions, 1901–1909.
Instructions for installing street kiosks. C. F. Marvin. 1909. Revised, 1912.
Brief list of meteorological textbooks and reference books. C. Fitzhugh Talman. 1909. Second edition, 1910. Third edition, 1913.
Description of cloud forms. 1910. Succeeded by: Cloud forms, 1921.
Instructions to the marine meteorological observers of the United States Weather Bureau. Henry L. Helskell. 1906. Second edition, 1908. Third edition, 1910. Fourth edition, 1925.
Circular to shipmasters. 1911.
Classification of clouds for the guidance of observers. 1911. Revised, 1917 (?).
Savannah-Charleston hurricane of August 27–28, 1911. Willis L. Moore. 1911.
The normal temperature of Porto Rico, West Indies. Oliver L. Fassig. 1911.
Instructions to storm-warning displaymen of the Weather Bureau. 1912.
The Weather Bureau kiosk. C. F. Marvin. 1914.
Climatic charts for the United States, showing the annual normals of temperature, the monthly normals for January and July, the highest temperatures ever observed, the lowest temperatures ever observed, the normal annual precipitation in inches, the average annual number of days with precipitation, and the mean relative humidity (percentage) at 8 a. m. and 8 p. m., seventy-fifth meridian time, for the months of January and July. 1915. Later editions have title: "Instructions for cooperative observers."
Instructions for the care and management of storm-warning stations of the Weather Bureau. 1916.
Tables for computing the time of moonrise and moonset. H. H. Kimball. 1916.
Weather forecasting in the United States. Alfred J. Henry, Edward H. Bowie, Henry J. Cox, and Harry C. Frankenfield. 1916.
Radiographic weather code for vessel weather observers. 1917. Revised, 1920; 1925.
Weather code for West Indian and Caribbean Sea observers. 1917.
Instructions for installation and use of telethermoscopes. 1918.
Instructions to operators on the United States Weather Bureau telegraph and telephone lines. S. P. Minnick. 1918.
Publications of the United States Weather Bureau available for distribution. C. V. Marvin. 1918. Revised, 1919. Robert Seyboth.
The marine meteorological service of the United States. 1919.
Instructions for aerological observers. W. R. Gregg, V. E. Jakl, W. S. Cloud, L. T. Samuels, and R. C. Lane. 1921.
Distribution of weather information, forecasts, and warnings by naval radio for the benefit of marine and aviation interests on the Pacific coast (in cooperation with Office of Communications, Navy Department). 1922.
The United States Weather Bureau: Supplementing exhibit of the United States Weather Bureau at the Brazil Centennial Exposition, Rio de Janeiro, Brazil, 1922–23. C. F. Marvin. 1922. (Also in Spanish and Portuguese.)
Tropical storms of the eastern north Pacific Ocean. Willis Edwin Hurd. 1923.
Weather code. (1892.) Revised, 1916; 1924.
Cloud forms according to the international system of classification. Benjamin C. Kadel, Harry C. Frankenfield, and Franklin G. Tingley. 1924.
Let us simplify our calendar and publish statistical data in standardized summaries. Comments at the meeting of the International Geodetic and Geophysical Union, Madrid, Spain, October, 1924. Charles F. Marvin. 1924.
The United States Weather Bureau in the West Indies. Oliver L. Fassig. 1924.
Explanation of the weather map. Willis L. Moore. (No date.)

MISCELLANEOUS

ATLAS OF AMERICAN AGRICULTURE

ADVANCE SHEETS

1. Average annual precipitation in inches (map). 1917.
2. Part II. Climate. Weather Bureau. Section 1. Frost and the growing season. William Gardner Reed. 1918.
3. Part IX. Rural population and organizations. Section 1. Rural population. E. A. Goldenweiser. 1919.
4. Part V. The crops. Section A. Cotton. O. C. Stine, O. E. Baker, O. F. Cook, H. D. Smith, Hugh H. Bennett, A. G. Smith, L. C. Gray, and Fred Taylor. 1918.
5. Part II. Climate. Section A. Precipitation and humidity. J. B. Kincer. 1922.
6. Part I. The physical basis of agriculture. Section E. Natural vegetation; Grassland and desert shrub. H. L. Shantz. Forests. Raphael Zon. 1924.

FOOD THRIFT SERIES

1. Help feed yourself. 1917.
2. Watch your kitchen waste. 1917.
3. Let nothing spoil. 1917.
4. An appeal to women. A meat substitute. Cowpeas as food. Fat in cookery. Dasheen finds favor. Salad plants. Meat in hot weather. Iceless refrigerator. Fireless cooker. Uses for honey. Food being wasted. 1917.
5. Wheatless meals. Home drying. Cottage cheese. Home-mixed flours. Reducing bread cost. How to select foods. Fruit juices for jelly. Food waste at home. Make cottage cheese. Don't let milk spoil. 1917.

UNITED STATES DEPARTMENT OF AGRICULTURE AND UNITED STATES FOOD ADMINISTRATION COOPERATING

UNITED STATES FOOD LEAFLETS

1. Start the day right with a good breakfast. 1917.
2. Do you know corn meal? 1917.
3. A whole dinner in one dish. 1917.
4. Choose your food wisely. 1917.
5. Make a little meat go a long way. 1917.
6. Do you know oat meal? 1917.
7. Food for your children. 1917.
8. Instead of meat. 1917.
9. Vegetables for winter. 1917.
10. Plenty of potatoes. 1917.
11. Milk. 1918.
12. Save fuel. 1918.
13. Let the fireless cooker help you cook. 1918.
14. Dried peas and beans. 1918.
15. Save sugar. 1918.
16. Fresh vegetables. 1918.
17. Use more fish. 1918.
18. Rice. 1918.
19. Hominy. 1918.
20. Wheatless breads and cakes. 1918.

UNITED STATES TREASURY DEPARTMENT AND DEPARTMENT OF AGRICULTURE

JOINT ORDERS

1. Regulations governing the certification and disinfection of hides, fleshings, hide cuttings, parings and glue stock, sheepskins and goatskins and parts thereof, hair, wool, and other animal by-products, hay, straw, forage, or similar material offered for entry into the United States. Effective January 1, 1917. 1917.
2. Regulations governing the sanitary handling and control of hides, fleshings, hide cuttings, parings, and glue stock, sheepskins and goatskins and parts thereof, hair, wool, and other animal by-products, hay, straw, forage or similar material offered for entry into the United States. Effective January 1, 1918.
3. Regulations providing for the importation into the United States below the southern cattle-quarantine line of tick-infested cattle from Mexico, South and Central America, the islands of the Gulf of Mexico, and the Caribbean Sea. Effective on and after May 1, 1918. 1918.

THRIFT LEAFLETS, 1919

1. Is thrift worth while, Mr. American?
2. Seven steps toward saving.
3. Wise spending saves clothing for the family.
4. Saving time and money by simple house cleaning.
5. Saving labor and materials by easier laundry methods.
6. How to remove stains.
7. Take care of your clothing.
8. Saving materials and money by special cleaning.
9. Thrift in lighting.
10. Thrift in the choice, use, and care of kitchen utensils.
11. Thrift in the use of fuel for cooking.
12. Saving fuel in heating.
13. Saving food by proper care.
14. Inexpensive ways of keeping food cool.
15. How shall we choose our food?
16. The weekly market basket.
17. Thrift on the farm.
18. Business methods for the home.
19. Teaching thrift to your children.
20. Thrift standards for boys and girls.

UNNUMBERED PUBLICATIONS

Official register of the Department of Agriculture. 1901. Revised, 1903; 1905.

Instructions to applicants for appointment to the position of mere unskilled laborer in the United States Department of Agriculture at Washington, D. C. 1902. Revised, 1904.

Regulations governing appointment to positions of mere unskilled labor, under the Department of Agriculture. Theodore Roosevelt and James Wilson. 1902.

Report of the committee on efficiency and economy in the Department of Agriculture. 1911.

Uncle Sam's cook book. (Contains 14 Farmers' Bulletins pertaining to cooking.) 1911.

Relation of the United States Department of Agriculture to the agricultural colleges and experiment stations. B. T. Galloway. (An address delivered at the meeting of the Association of American Agricultural Colleges and Experiment Stations, November 4, 1913.) 1913.

Administrative regulations of the Department of Agriculture. Effective July 1, 1914. 1914.

Amendment No. 1. 1915.

——Revised 1918. *See* Advisory committee on finance and business methods, unnumbered publications.

Atlas of United States Department of Agriculture. 16 maps. 1914.

List of workers in subjects pertaining to agriculture and home economics in the United States Department of Agriculture and in the State agricultural colleges and experiment stations. Corrected to June 1, 1914. 1914.

———. Corrected to August 1, 1915. 1915.

———. Corrected to December, 1915. 1916.

———. Corrected to January, 1917. 1917. Later revisions with changes of title as follows:

List of workers in subjects pertaining to agriculture and home economics. 1917–1918. Part I. United States Department of Agriculture. Part II. State agricultural colleges and experiment stations. 1918.

List of workers in subjects pertaining to agriculture, home economics, and marketing, 1918–19. Part I. United States Department of Agriculture. Part II. State agricultural colleges and experiment stations. 1919.

List of workers in subjects pertaining to agriculture. 1920–21. Part I. United States Department of Agriculture. Part II. State agricultural colleges and experiment stations. 1921.

———. 1921–22. 1922.

———. 1922–23. Part I. Not published. Part II published as Miscellaneous Circular 4.

———. 1923–24. Part I. Not published. Part II published as Miscellaneous Circular 17.

List of workers in subjects pertaining to agriculture in State agricultural colleges and experiment stations, 1924–25. Published as Miscellaneous Circular 34.

List of technical workers in the United States Department of Agriculture, 1924–25. Published as Miscellaneous Circular 45.

Rules and regulations for the government of the watch force of the United States Department of Agriculture. Effective May 1, 1915. R. M. Reese. 1915.

Proceedings of a conference to consider means for combating foot-and-mouth disease, held at Chicago, Ill., November 29 and 30, 1915. 1916.

Back yard poultry leaflet. 1917.

Planting zones for vegetables in the eastern half of the United States. 1917.

Report of conferences on agricultural situation held at St. Louis, Mo., April 9–10, and at Berkeley, Calif., April 13, 1917. Program for food production and conservation. 1917.

Explosives and fires in threshing machines can be prevented. 1918.

It's easy to get Corn-belt eggs to market in prime condition. 1918.

It's easy to get southern eggs to market in prime condition. 1918.

Prevent grain dust explosions and fires. It is possible—necessary. 1918.

Report of advisory committee of agricultural and livestock producers. 1918.

Sirups and honey by parcel post. 1918.

The President to the farmers of America. Woodrow Wilson. 1918.

Memorandum: Prepared by the Agricultural Department and the Food Administration as to the wheat price guaranteed by Congress. 1919.

Report of the agricultural commission to Europe. 1919.

Warehousing farm products under the warehouse act. Pamphlet containing questions and answers about the storage of agricultural products in warehouses under Federal supervision as provided for in the warehouse act. 1923. Revised 1924; 1925.

PERIODICALS

DEPARTMENT

AGRICULTURAL OUTLOOK

Succeeds the Crop Reporter hereinafter described. Occasional pamphlets listed as farmers' bulletins. (First issue was Farmers' Bulletin 558, September, 1913.) Weather conditions during the past month with relation to crops; the condition of cereal crops; the outlook for such staples as potatoes, tobacco, apples, etc.; the meat situation and the outlook for its production, marketing and future supply, and various statistical tables. Succeeded by Monthly Crop Report, 1915, hereinafter described.

WEATHER, CROPS, AND MARKETS

Vol. 1, No. 1, to vol. 4, No. 26. January 7, 1922, to December 29, 1923. Weekly

Presents nearly the same kinds of material heretofore published in the Market Reporter, the National Weather and Crop Bulletin, and the Monthly Crop Reporter. Weekly and monthly reviews and statistical information relative to the principal markets for farm products, complete and detailed reports of the crop estimating service, and weekly summaries of weather and crop conditions. Also articles of general economic and statistical interest concerning leading agricultural products. Succeeded by—

CROPS AND MARKETS

Vol. 1, No. 1, to vol. 2, No. 26. January 5, 1924, to December 26, 1925. Weekly

Monthly Supplement. Vol. 1, No. 1, to vol. 2, No. 12. January, 1924, to December, 1925. Monthly

Statistics of crops and livestock and market information. Reports on supplies, stocks, commercial movements, condition and prices of agricultural products covered in the work of marketing and crop estimating, and studies of prices and demand, both foreign and domestic.

Monthly crop reports and other monthly statistical summaries published in the monthly statistical supplement.

DEPARTMENTAL CIRCULAR

Vol. 1, Nos. 1–8. May 10, 1915, to December 10, 1915. Monthly

A convenient means of intercommunication of official information among the personnel of the department. Published exclusively for the use of the personnel. Discontinued 1915. Information of similar nature later contained in the Official Record, hereinafter described.

JOURNAL OF AGRICULTURAL RESEARCH

Vol. 1, No. 1, to vol. 31, No. 12, October, 1913, to December 15, 1925

Vol. 1, No. 1, to vol. 4, No. 6. October, 1913, to September 15, 1915. Monthly.
Vol. 5, No. 1, to vol. 16, No. 12. October 4, 1915, to March 24, 1919. Weekly.
Vol. 17, Nos. 1 to 6. April 15, 1919, to September 15, 1919. Monthly.
Vol. 18, No. 1, to vol. 21, No. 11. October 1, 1919, to September 1, 1921. Semimonthly.
Vol. 22, Nos. 1 to 10. October 1, 1921, to December 3, 1921. Weekly.

Publication was temporarily suspended with vol. 22, No. 10, and no parts were issued for 1922.

Vol. 23, No. 1, to vol. 28, No. 12. January 6, 1923, to June 21, 1924. Weekly.
Vol. 29, No. 1, to vol. 31, No. 12. July 1, 1924, to December 15, 1925. Semimonthly.

Articles based on technical research carried on by the United States Department of Agriculture and the State agricultural experiment stations, or both cooperatively

WEEKLY NEWS LETTER TO CROP CORRESPONDENTS

Vol. 1, No. 1, to vol. 2, No. 35. August 13, 1913, to April 7, 1915. Weekly

News of the important current activities of the department and practical directions for the improvement of farm practice. Information for reprinting in newspapers and agricultural journals. Succeeded by—

WEEKLY NEWS LETTER

Vol. 2, No. 36, to vol. 9, No. 19. April 14, 1915, to December 7, 1921. Weekly

Slight change in character. Chronicle of the major aims and activities of the department. Matter relative to general policy, program, and progress of work on projects. Announcements of important changes in policy or organization. Succeeded by—

THE OFFICIAL RECORD

Vol. 1, No. 1, to vol. 4, No. 52. January 4, 1922, to December 30, 1925. Weekly

A means of communicating to workers and cooperators of the department official statements and other information necessary to the performance of their duties.

BUREAUS

CROP ESTIMATES

MONTHLY CROP REPORT

Vol. 1, No. 1, to vol. 5, No. 1. May 10, 1915, to January, 1919

Succeeds Agricultural Outlook hereinbefore described. Data relating to agriculture, including estimates of acreage, condition, yield, production, prices, and value of crops and livestock, in the form of tabular statements, and such text summaries and comments as are necessary to interpret the same. Succeeded by—

MONTHLY CROP REPORTER

Vol. 5, No. 2, to vol. 7, No. 12. February, 1919, to December, 1921

No change in character. Succeeded by Weather, Crops, and Markets hereinbefore described.

EXPERIMENT STATIONS

EXPERIMENT STATION RECORD

Vol. 13, No. 1, to vol. 53, No. 9. 1901–1925
General Index, vols. 1–12. 1889–1901. 1903
General Index, vols. 13–25. 1901–1911. 1913

Vols. 13 to 20, 12 numbers each. No. 12 contains index. 1901 to June, 1909. One volume a year.
Vols. 21 to 24, 8 numbers each, and index. July, 1909, to June, 1911. Two volumes a year.
Vols. 25 to 53, 9 numbers each, and index. July 1911, to December, 1925. Two volumes a year.

Abstracts and reviews of the world's scientific literature pertaining to agriculture. Each volume contains about 3,500 abstracts of current research in the various fields of agriculture, together with brief notes on the progress of agricultural education and research and monthly editorials dealing with some phase of its advancement.

FOREST SERVICE

FIELD PROGRAM

August, 1904 to July, 1920

August, 1904, to June, 1910. Monthly.
(None issued January to June, 1905.)
July, 1910, to July, 1920. Quarterly.

Schedule of field work and assignments in the Forest Service. Information concerning changes of projects and addresses of personnel. Name changed to—

SERVICE DIRECTORY

October, 1920, to April, 1922. Semiannual

No change in character. Name changed to—

FOREST SERVICE DIRECTORY

October, 1922, to April, 1924. Semiannual

No change in character. Name changed to—

DIRECTORY

October, 1924, to October, 1925. Semiannual

FOREST SERVICE—continued

WHOLESALE PRICES OF LUMBER

May, 1908, to September, 1908. Monthly

Price lists of hard and soft woods. Name changed to—

RECORD OF WHOLESALE PRICES OF LUMBER (PER M. FT., B. M.) BASED ON ACTUAL SALES MADE F. O. B. EACH MARKET

October, 1908, to September, 1912

October, 1908, to September, 1909. Lists A and B. Monthly.
October, 1909, to September, 1912. List A only. Quarterly.

Change in size from large sheets to cards.

LIBRARY

MONTHLY BULLETIN

Vol. 1, No. 1, to vol. 4, No. 6. January, 1910, to June, 1913. Monthly

Contains the list of accessions to the library formerly issued quarterly in its series of bulletins.

MARKETS

FOOD SURVEYS

Vol. 1, No. 1, to vol. 2, No. 27. April 29, 1918, to June 27, 1919. Monthly and special issues

Results of surveys made under the food surveys project. Such information concerning food and food materials as seemed necessary or desirable for the guidance of governmental agencies and the public in making plans for increasing production, for promoting efficient distribution, and for directing conservation and utilization of foods. Discontinued in 1919. In 1920 merged with Food Surveys to form—

MARKET REPORTER

Vol. 1, No. 1, to vol. 4, No. 27. January 3, 1920, to December 31, 1921. Weekly

A merger of Seed Reporter and Food Surveys and information previously issued in mimeographed form. Marketing information of general interest and of permanent value on livestock, dairy products, cotton, grains, fruits, vegetables and other important agricultural products, both staple and perishable. Leading articles, comprehensive weekly and monthly summaries of movement, marketing, and prices of specified commodities, and tabulated statistics with interpretative text. Succeeded by Weather, Crops, and Markets hereinbefore described.

PLANT INDUSTRY

SEED REPORTER

Vol. 1, No. 1, to vol. 3, No. 4. November, 1917, to October 11, 1919. Monthly

Vol. 1, No. 1–9. November, 1917, to June 8, 1918.
Vol. 2, No. 1–12. July 6, 1918, to June 7, 1919.
Vol. 3, No. 1–4. July 12, 1919, to October 11, 1919.

Official organ of the seed reporting service, which was a war emergency service, conducted under the food production act. Such information concerning seeds as was necessary or desirable for the guidance of governmental agencies and the public in making plans for increasing production, for promoting efficient distribution, and for directing conservation and utilization. Discontinued in 1919. In 1920 merged with Food Surveys to form the Market Reporter, hereinbefore described.

PUBLIC ROADS

PUBLIC ROADS (MAGAZINE)

Vol. 1, No. 1, to vol. 4, No. 8. May, 1918, to December, 1921. Monthly

(None issued 1922 and 1923.)

Vol. 5, No. 1, to vol. 6, No. 10. March, 1924, to December, 1925. Monthly

Results of investigations relating to the physical and economic problems of highway research and road building conducted by the Bureau of Public Roads and contributors outside of the bureau, together with other data of general interest in road engineering and construction.

PUBLICATIONS

MONTHLY LIST OF PUBLICATIONS

July, 1901, to October, 1923. Monthly

Descriptive list of new publications of the department, including periodicals and other serials, available for purchase and for free distribution. Succeeded by—

PUBLICATIONS ISSUED

(Postal cards)

November, 1923, to March, 1924. Monthly.

Changes in character were omission of serials and description of bulletins. Succeeded by unnumbered cards—no title.

April, 1924, to September, 1925. Monthly

Only 11 of these cards were issued. Succeeded by—

NEW PUBLICATIONS

Nos. 12 to 14. October, 1925, to December, 1925. Monthly

STATISTICS

CROP REPORTER

Vol. 3, No. 3, to vol. 15, No. 6. July, 1901, to June, 1913. Monthly

Directions for crop correspondents. Information concerning acreage, growing conditions, production and quality expressed in percentages, weather and crop conditions, and estimates of the crops on hand. Special articles on agricultural products, both foreign and domestic. Succeeded by Agricultural Outlook hereinbefore described.

WEATHER BUREAU

CIRCULAR

January 2, 1901, to December 1, 1909. Monthly

Information relative to changes in personnel. Lists employees, stations where on duty and data concerning appointments, promotions, reductions, transfers, and other personnel information. Name changed to—

MONTHLY LIST OF CHANGES IN PERSONNEL

January 3, 1910, to June, 1915. Monthly

No change in character. Succeeded by—

WEATHER BUREAU TOPICS AND PERSONNEL

July, 1915, to December, 1925. Monthly

A combination of Monthly List of Changes in Personnel and Roster hereinafter described. Slight change in character with addition of notices, announcements, and information for use of employees.

CLIMATE AND CROP BULLETIN

1901, No. 1, to 1904, No. 23. February 1, 1901, to August 23, 1904

1901, No. 1, to 1903, No. 3. February 1, 1901, to April 1, 1903. Monthly.
1903, No. 4, to 1904, No. 23. April 8, 1903, to August 23, 1904. Weekly.

Maximum and minimum temperatures, normal temperature and precipitation, with departures therefrom, expressed in tables and maps, and explained by text. Succeeded by—

WEATHER CROP BULLETIN

1904, No. 24, to 1906, No. 1. August 29, 1904, to February 1, 1906

April to October, weekly; November to March, monthly

No change in character. Succeeded by—

NATIONAL WEATHER BULLETIN

1906, No. 2, to 1914, No. 15. February 8, 1906, to June 29, 1914

April to October, weekly; November to March, monthly

No change in character. Succeeded by—

WEATHER BUREAU—continued

NATIONAL WEATHER AND CROP BULLETIN

1914, No. 16, to 1921, No. 49. July 6, 1914, to December, 1921

April to October, weekly; November to March, monthly

In 1919, No. 37, the Snow and Ice Bulletin was combined with this and during winter months the title reads: National Weather and Crop and Snow and Ice Bulletin (hereinafter referred to). Beginning with 1922, this publication combined with Market Reporter and Crop Reporter to form—Weather, Crops, and Markets hereinbefore described. This, in turn, was succeeded by—

WEEKLY WEATHER AND CROP BULLETIN

1924, No. 1, to 1925, No. 52. January, 1924, to December 29, 1925. Weekly

Detailed weather conditions of the preceding week and their effect on the development of crops and farm operations; the variation of temperature and rainfall from a normal week, the total rainfall for the season in comparison with the normal, also the amount of sunshine and cloudiness.

CLIMATE AND CROP SERVICE

January, 1901, to December, 1905. Monthly

General summary of the weather by months and complete weather statistics from 42 separate sections corresponding, as a rule, to a State. Tables show killing frosts, precipitation, sunshine, relative humidity, and average hourly wind velocity. Succeeded by—

CLIMATOLOGICAL SERVICE REPORT

January, 1906, to June, 1909. Monthly

No change in character. No reports published July, 1909, to December, 1913. Information contained in Monthly Weather Review for those dates and also reprinted in report of the district concerned. Ceased publication June, 1909. Later succeeded by—

CLIMATOLOGICAL DATA

January, 1914, to December, 1925. Monthly

No change in character from earlier climatological reports.

COTTON REGION CLIMATE AND CROP BULLETIN

April, 1902, to October, 1904. Weekly

Information on weather conditions and summary of weather and crop conditions in the cotton region, issued during the cotton planting and crop season, April through October. Published at New Orleans, La. Name changed to—

COTTON REGION WEATHER CROP BULLETIN

May, 1905, to October, 1905. Weekly

No change in character. Name changed to—

WEEKLY COTTON REGION WEATHER BULLETIN

April, 1906, to October, 1916. Weekly

No change in character. Name changed to—

WEEKLY COTTON REGION BULLETIN

April, 1917, to October, 1925. Weekly

FORECAST FOR THE WEEK BEGINNING . . .

December 7, 1913, to October 11, 1914; April 15, 1915, to October 26, 1915; March 18, 1916, to September 20, 1921. Weekly

Brief, general forecast of temperature and rain conditions covering a week, for each of eight main sections into which the United States is divided. Name changed to—

WEATHER OUTLOOK

September 27, 1921, to December 19, 1925. Weekly

No change in character

WEATHER BUREAU—continued

METEOROLOGICAL CHART OF THE GREAT LAKES

1901, No. 1, to 1907, No. 1. Semiannual

Two numbers a year, the second one being a summary for the season. Publication suspended until—

January, 1911, to September, 1913. Monthly

Average conditions of wind and weather over the Great Lakes during the month, Addresses of branch Weather Bureau offices on the Lakes, character of weather, storm tracks, and interpretation of symbols used. Ceased publication September, 1913.

MONTHLY WEATHER REVIEW

Vol. 29, No. 7, to vol. 53, No. 12. July, 1901, to December, 1925. Monthly

Contributions from the research staff of the Weather Bureau and special contributions of a general character on meteorology and climatology; also climatological data for Weather Bureau stations.

MOUNT WEATHER OBSERVATORY BULLETIN

Vol. 1, pt. 1, to vol. 6, pt. 5. 1908–1914. Quarterly

Detailed accounts of researches into the fundamental principals that underlie meteorological science, conducted at Mount Weather, Va. Discontinued 1914. Later contributions from members of the staff of the observatory are published in the Monthly Weather Review and in supplements to it.

SNOW AND ICE BULLETIN

December 2, 1901, to March 25, 1919. Weekly, December to April

A synopsis of snow fall and of ice formation in the United States, showing areas covered by snow, depth of snow, thickness of ice in rivers and harbors, etc. Succeeded by—

NATIONAL WEATHER AND CROP AND SNOW AND ICE BULLETIN

December, 1919, to December, 1921. Monthly

A combination of Snow and Ice Bulletin and National Weather and Crop Bulletin, hereinbefore described.

ROSTER OF STATION OFFICIALS AND EMPLOYEES OF THE WEATHER BUREAU

July 1, 1901, to July, 1910. Monthly

Ceased publication in 1910. Information of similar nature later contained in Weather Bureau Topics and Personnel, hereinbefore described.

WEATHER MAPS (FIRST EDITION)

1901 to 1925. Daily except Sunday

Isobaric and isothermic conditions of the previous day based on reports from 65 stations throughout the country. Published at these stations and at Washington, D. C. Description of the weather conditions of the previous day and a general forecast. Specific forecast until 8 p. m. the following day for the districts in each section covered by a map.

WEATHER MAPS (SECOND EDITION)

1901 to 1925. Daily

Isobaric and isothermic conditions of the previous day and general forecasts for all parts of the country. Published only at Washington, D. C.

WEEKLY CORN AND WHEAT REGION BULLETIN

1920, No. 1, to 1925, No. 22. April 13, 1920, to September 15, 1925. Weekly, April to October

Weather conditions, general summary of weather and crop conditions (issued from Washington, D. C.) and special telegraphic reports. Maps show departure of mean temperature from the normal for the past week, and the amount of rainfall.

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UNITED STATES DEPARTMENT OF AGRICULTURE

MISCELLANEOUS PUBLICATION NO. 10

Washington, D. C. November, 1927

THE ESTABLISHMENT OF STANDARD GRADES FOR AMERICAN COTTON LINTERS

By GUY S. MELOY, *Assistant Chief Marketing Specialist, Division of Cotton Marketing, Bureau of Agricultural Economics*

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As a matter of public interest and in order to furnish a more complete description of the standards, a brief review is here given of American cotton linters and of the movement leading to the establishment of standard grades for the commodity under the authority of the cotton standards act.

COTTON LINTERS DEFINED

Cotton has been defined as "the vegetable hair removed from cottonseed in the usual processes of ginning," and cotton linters as "the vegetable hair removed from cottonseed in processes subsequent to the usual processes of ginning." This hair or residual fiber called linters is usually recovered by intensive ginning or delinting as a step in the preparation of cottonseed for crushing.

NEED FOR STANDARDS

During the season 1913-14, immediately preceding the outbreak of the World War, 4,847,628 tons of cottonseed were crushed, from which 660,087 bales of linters of 500 pounds net were recovered. These were valued at $7,630,000.[1]

Linters is an excellent source of munitions cellulose and its production is localized at a comparatively few points—the cottonseed oil mills. The source of linters being so easily accessible, as soon as the United States entered the World War, rules were immediately issued

[1] U. S. BUREAU OF THE CENSUS. COTTON PRODUCTION AND DISTRIBUTION, SEASON OF 1926-26. U. S. Bu. Census Bul. 160, 65 p., Illus. 1926.

governing their cutting or recovery, and the entire crop was requisitioned for war uses. The crop of 1916-17 amounted to 1,273,345 bales valued at $45,193,000, and that of 1917–18 to 1,080,802 bales valued at $26,604,000. To meet war requirements and in the absence of standards as a guide, the intensity of the delinting processes was increased without knowledge of the probable results. At the sudden termination of hostilities, the War Department found that it had on hand a great confusion of qualities of linters, in enormous quantities and with little peace-time value. The War Industries Board immediately requested that a study of the situation be made with a view to the establishment of standard grades. Studies were promptly undertaken by the Department of Agriculture, and four tentative grades were proposed. In the meantime, however, the supply on hand had been disposed of by the War Department, and the crop and its value had dropped to 422,226 bales worth only $3,506,000. Interest in the subject for the time being was lost.

INDUSTRY REQUESTS STANDARDS

With the crop of 1923–24, however, production of linters had increased to 642,384 bales worth over $22,000,000 and the industry itself revived the question, which took the form of a resolution by the Interstate Cotton Seed Crushers' Association in annual convention in New Orleans, May, 1924. In this resolution the Secretary of Agriculture was requested to renew the study of the commodity with a view to the establishment of standard grades. These studies were begun in July, 1924, and were followed along three lines: (1) The requirements and preferences of the consumers of linters; (2) the methods of grading and marketing linters used by dealers, brokers, and agents; and (3) the methods of delinting or recovering linters and the possibilities of controlling the quality of linters by mechanical adjustments of the delinting apparatus. These studies were immeasurably facilitated by the hearty cooperation that was given by all branches of the industry, producers, middlemen, and consumers. To assist the department in the work, the Interstate Cotton Seed Crushers' Association appointed the following committee on the standardization of linters: A. K. Burrow of Memphis, Tenn., chairman, T. J. Kidd of Birmingham, Ala., Edgar L. Pearson of Houston, Tex., S. W. Wilbor of Paris, Tex., P. H. Lamar of Atlanta, Ga., and J. H. Turberville of Jackson, Miss.

This committee was supplemented by A. A. Taylor of Lockland, Ohio, representing the Better Bedding Alliance of America and D. G. Robson of Memphis, Tenn., representing the American Cotton Linters Association.

DEFINITIONS OF TERMS

Two conclusions were reached from these studies: (1) That linters is a commixture of two types of fibers—the long, usually soft or flaccid fibers that may have escaped removal during ginning, and the very short, more deeply colored fibers or fuzz that are found more or less densely matted about the seed coat at the base of the long fibers of American upland varieties of cotton; (2) that there are four factors influencing the grade or value of linters—staple, foreign matter, color, and character.

STAPLE

In describing linters the word staple is used with reference to the different blends or the preponderance of one or the other of the two types of fiber of which linters is composed. While the degree of intensity of the delinting process and the variations in the total residual fiber in different lots of seed make possible all degrees in the mixtures or blends of these two types of fiber, each special channel of consumption is very definitely limited to comparatively narrow variations in the blends.

FOREIGN MATTER

The quantity of foreign matter in linters is very largely controlled by the care exercised in cleaning the seed before delinting. Foreign matter consists chiefly of broken leaves, motes, sticks, dirt or dust, and particles of the seed coat or hull that have been rasped off by the delinting saws. The nature of the foreign matter varies in the different geographic sections in which linters are produced. In southeastern linters the foreign matter is likely to consist chiefly of very fine particles of the seed coat, known as pepper trash. The particles of seed coat or hull in valley linters are usually larger than in southeastern linters. Western linters are usually rather free of pepper trash, but frequently contain more large pieces of hull, broken leaves, etc., than are found in linters from other sections.

COLOR

The normal or natural colors of linters are olive and buff, with different shades of the two. During exposure to light the olive coloring sometimes shades off through a deep buff to a light buff. In trade parlance these colors are usually spoken of as green, reddish, and cream. Olive prevails in southeastern and valley linters and buff to light buff in western and southwestern linters. Natural colors are easily bleached. Other colors also are sometimes found in linters. They are usually the result of weather damage or fungous staining of the fiber, either while yet on the undelinted seed or after delinting and baling, through exposure of the bale. Such colors might be called unnatural colors and are difficult or impossible to bleach.

CHARACTER

Character is a term used to cover a combination of three elements—maximum length and uniformity in length of the long fibers, softness or harshness (resiliency) of the mass of fibers as a whole, and smoothness or neppiness. Character in linters is apparently sectional, and is probably influenced by soil and seasonal conditions and by the prevailing varieties of cotton planted. Western or Texas-Oklahoma linters are harsh, resilient, usually neppy, and the long fibers are comparatively short and regular in length. Mississippi Valley linters, usually called valley linters, are soft. The long fibers are the longest found in linters, but usually are irregular in length. Valley linters are frequently neppy, but not as distinctly so as western linters. Southeastern linters compare with valley linters in softness, but are smoother and less neppy. The long fibers are intermediate in length between western and valley linters, and are uniform in length. In general both valley and western linters appear to be a homogeneous mixture or blending of the long

fibers and fuzz. Southeastern linters are distinctly different in this respect from linters produced in the other two regions, having a filamentous appearance as if made up of fine laminations of the long fibers and the fuzz. In the trade the three characters of linters are described simply as "southeastern," "valley," and "western."

While the color of linters and the character are both usually associated with certain sections which might be roughly described as southeastern, valley, and western, at times linters of the character and color usually associated with one section may be produced in another section.

CUTTING

Reginning, or delinting, is more generally spoken of as "cutting."

FIRST CUTS

Cuts ranging from 20 to 50 pounds per ton of seed have generally become known as "first cuts" or "first-cut linters."

MILL RUNS

Cuts ranging from about 35 to 100 pounds or more per ton of seed are known as "mill runs" or "mill-run linters."

SECOND CUTS

After a first cutting, especially if not over 35 pounds per ton of seed have been removed in the first delinting, the seed are frequently passed through the linter machine a second time. The linters thus recovered are known as "second cuts." The total amount of linters cut ranges from about 30 pounds to as high as 200 pounds per ton of seed.

HULL FIBER

It has not been found generally economical to attempt a complete denuding of the seed preparatory to crushing. A heavy cut mill run or a second cut is usually sufficient for practical purposes. This leaves a portion of the fuzz still attached to the seed coats or hulls when the seed are decorticated and the kernels and hulls separated. The demand for cellulose has been so acute in recent years that a number of mills have installed special apparatus for recovering the fiber from the hulls, after decortication. Linters of this type of fiber have become known generally as "hull fiber."

GRADES PROPOSED

With this information the department constructed seven tentative grades. These grades were based chiefly on the different blends of the two types of fibers and combined in each grade samples of such different blends as are usually baled together in well-managed mills, are within the possibilities of control by mechanical adjustments of the delinting apparatus, and meet the special requirements of consumption. Each grade was made up of 12 samples in the normal colors of linters. The three sectional characters were represented by the same four samples in each box, and foreign matter was shown of the usual sectional nature and in an amount not easily removed and usually to be found in linters carefully cut and baled.

In this manner each box of 12 samples representing a single grade of linters was made to embody, as nearly as possible, the ideals of the consumers and the possibilities of the producers. One grade, for

instance, illustrates linters desirable for absorbent cotton, surgical dressings, spinning, high-grade battings, etc. Another illustrates linters suitable for certain nitrating purposes, and another, the most desired form of linters for munitions. Each meets the requirements for particular types of mattress feltings.

These seven boxes of samples representing a new plan for the grading of linters were presented by the department to a special meeting of the linters standardization committee held in Memphis, Tenn., on January 9, 1925. All members of the committee were present at this meeting, together with the representatives of the Better Bedding Alliance and the American Cotton Linters Association. After a thorough discussion, the plan presented for the grading of linters was approved and later, after the positions of two or three samples had been interchanged, the boxes as a whole were also unanimously approved as grades.

On January 13, 14, and 15, 1925, the proposed grades were exhibited and discussed at the annual convention of the Better Bedding Alliance of America held in Chicago, Ill. This convention passed a resolution approving the boxes as standard grades.

Following this the boxes were presented to the convention of the Interstate Cotton Seed Crushers' Association held in New Orleans May 13, 14, and 15, 1925. After a thorough discussion this convention approved the grades and recommended their adoption as official standards.

GRADES PROMULGATED

With its work so fully indorsed, the department proceeded with the legal phases of establishing the proposed grades as part of the official standards of the United States. This was accomplished by an order of the Secretary dated July 7, 1925, establishing them immediately as tentative standards and giving public notice that on August 1, 1926, they would become the official standard grades of the United States for American cotton linters.

Since that form of linters known as hull fiber is composed almost exclusively of the fuzz type of fiber, most of which is itself broken or cut, it is not possible to put up permanent samples of it in the form of physical types. Therefore, the order of the Secretary simply describes such linters in the following terms: "American cotton linters, the fiber of which is below that shown in grade 7 herein established, shall be designated as 'hull fiber.'"

USING THE STANDARDS

The construction of the boxes containing the samples of physical types representing the standard grades is simple and yet so comprehensive as to permit of a very wide range of subdivision for trading purposes. In each box or grade the samples are placed in three rows of four samples each. Samples 1, 2, 3, and 4 in the top tier of each box represent the character and foreign matter of southeastern linters. Samples 5, 6, 7, and 8, the middle tier, represent valley linters. The bottom tier, samples 9, 10, 11, and 12, represent western linters. Samples 1, 5, and 9 of each box represent the blends, for each character, having the greatest proportion of long fibers included in each grade; and samples 4, 8, and 12 represent the blends having the smallest portions of long fibers in each grade. In adjacent grades, samples 4, 8, and 12 of the higher grade are the equal, respectively,

of samples 1, 5, and 9 of the next lower grade. Therefore, in each character there are 28 samples in all, 6 of which are duplicates, leaving 22 samples to represent the entire range of blends of fiber from that having the highest proportion of long fiber to that having the largest proportion of fuzz. These 22 samples are divided into seven sections which are designated as grades.

SUBDIVISIONS OF GRADES

This arrangement of samples and characters enables the grades to be subdivided for trading purposes (1) directly into the three characters, and (2) whenever expedient, by reference to the number of the sample and grade down to individual samples or combinations of samples.

The three characters for each grade were assembled into a single box primarily for the convenience of traders, but this grouping should be advantageous to producers because of the occasional seasonal occurance of a particular character outside of its normal region. It should be of value also to consumers so that all may be advised fully as to all qualities of linters available.

BOARD OF COTTON LINTERS EXAMINERS

On December 11, 1926, the regulations of the Secretary of Agriculture under the cotton standards act were amended so as to provide the same Government facilities and service for cotton linters as were available for cotton. Under this amendment a board of cotton linters examiners was established in Washington, D. C., consisting of three members (G. S. Meloy, chairman, F. S. Hubbard, vice chairman, and V. R. Fuchs), with power to certificate the grade and character of such samples and bales of linters as might be submitted for the purpose.

Provision was made also for the licensing of competent persons to grade and classify linters and to certificate the grade or the class in accordance with the official standards of the United States for American cotton linters.

On March 25, 1927, a meeting was held in Memphis, Tenn., at the call of the linters standardization committee of the Interstate Cotton Seed Crushers' Association, to which were invited representatives of the Mattress Manufacturers Association, the chemical users of linters, linters dealers' associations and exchanges, and cottonseed crushers. The purpose of the meeting was to discuss the sufficiency and the increased utilization of the standard grades.

During the conference it was brought out that both the construction of the grades and the method of preparation of the samples were entirely new to the industry. The department was requested to furnish holders of copies of the standard grades with small loose samples illustrating the characters and staples as represented in the standard grades so that they might better acquaint themselves with the standards. This the department agreed to do with the understanding that the samples so furnished would be used for informative purposes only, without official status and would not be used or substituted for the standards.

The conference also recommended that the linters standardization committee of the Interstate Cotton Seed Crushers' Association draft trading rules on which transactions involving linters might be based.

INDUSTRIAL TRADING RULES

At the annual convention of the Interstate Cotton Seed Crushers' Association held in Memphis, Tenn., May 25, 26, and 27, 1927, the linters standardization committee brought in its report, which included a complete set of trading rules recognizing and based upon the use of the standard grades. These trading rules are the first of their kind covering transactions in linters, which warrants their incorporation in this report. The rules as adopted by the convention [2] are as follows:

American cotton linters.—Contracts for the purchase and sale of American cotton linters, unless otherwise specified, shall be subject to the following terms:

(1) In all contracts for specific grades of cotton linters the grades of the official standards of the United States for American cotton linters shall be used or implied, unless purchases are made on actual samples or types.

(2) Sales calling for even running grades may contain bales of grades other than that specified, as follows:

(*a*) Sales of U. S. grade No. 1 may contain not to exceed 5 per cent of bales fully equal to U. S. grade No. 2.

(*b*) Sales of U. S. grade No. 2 may contain not to exceed 10 per cent of bales fully equal to U. S. grade No. 3, if offset by 10 per cent of bales better than U. S. grade No. 2, but not necessarily fully equal to U. S. grade No. 1.

(*c*) Sales of U. S. grade No. 3 may contain not to exceed 10 per cent of bales fully equal to U. S. grade No. 4, if offset by 10 per cent of bales better than U. S. grade No. 3.

(*d*) Sales of U. S. grade No. 4 may contain not to exceed 10 per cent of bales fully equal to U. S. grade No. 5, if offset by 10 per cent of bales better than U. S. grade No. 4.

(*e*) Sales of U. S. grade No. 5 may contain not to exceed 5 per cent of bales fully equal to U. S. grade No. 6, if offset by 5 per cent of bales better than U. S. grade No. 5.

(*f*) Sales of U. S. grade No. 6 may contain not to exceed 5 per cent of bales equal to U. S. grade No. 7, if offset by 5 per cent of bales equal to U. S. grade No. 5.

(*g*) Sales of U. S. grade No. 7 may contain not to exceed 10 per cent of bales equal to U. S. grade No. 6.

(3) Sales of linters of combination grades may contain even running bales or bales containing a combination of two or more grades. In such sales, the seller shall estimate and state the percentage of each grade in the lot; and delivery shall be good, provided not less than 90 per cent of the estimate for each grade be tendered.

(4) Unless otherwise specified linters shall be of natural colors only.

(5) Sectional character shall be specified, otherwise grading shall be done without reference to this character.

Excess of low grades.—Any excess of low grade may be rejected by the purchaser, or claimed for at an allowance. If rejected and rejection sustained, the seller is to have the right to replace, and the purchaser may require replacement. The cost and actual expense of handling rejections shall be paid by the loser.

Sales on actual samples.—Whenever a specific lot of cotton linters purchased on actual samples does not equal the samples, the purchaser shall have the right to reject the lot if less than one-half is equal to the samples. If one-half or more is equal to the samples, the purchaser may reject the portion not equal to the samples; but in either event, samples of the entire lot must be exhibited to the seller. The cost and actual expense of handling rejections shall be paid by the seller, and in case of rejection the seller shall not be called upon to replace.

Time limits for replacements.—Whenever, under these rules following agreed or sustained rejection, replacement is made, seller shall have the following time limit to effect such replacement. It is understood that this computation is to begin with the actual date of notice or demand by buyer or seller (as the case

[2] The Interstate Cotton Seed Crushers' Association includes in its membership cottonseed crushers, cottonseed-oil refiners, producers of linters, dealers in linters, and consumers of linters.

may be) that replacement is desired and it is further understood in computing time that delivery f. o. b. a shipping point is implied.

(*a*) Where contract provides for "immediate" shipment, replacement is to be made within three days.

(*b*) In all other cases, replacement is to be made within 10 days.

Linters made from threshed, burned, or damaged seed.—Linters made from threshed, burned, or damaged seed, and which are consequently affected in quality, or linters carrying an objectionable odor, shall not be a good delivery on contract, and may be rejected by buyer, and replacement may be demanded.

Linters containing excess trash, etc.—Linters containing excess trash, whole seed, sweepings, or hull fiber may be rejected by buyer, who may demand same replaced.

Cottonseed hull fiber.—Cottonseed hull fiber shall be that form of linters defined by the Secretary of Agriculture in section 8, Service and Regulatory Announcements No. 94.

Standard weight and dimensions.—The standard bale of American cotton linters, for contract purposes, shall average 600 pounds, including tare, and bales weighing less than 450 pounds shall not be tenderable on contract.

The tare shall not exceed 5 per cent.

Weather damage.—Linters must be suitably baled and tied and free from weather damage.

Classification.—In arbitration of linters either party shall have the right to demand official classification by the United States Department of Agriculture, which shall be final, but nothing in this rule shall prevent the mutual agreement to arbitrate under the terms of rule 290.

Sampling (for arbitration), time, place, and method.—When at American destination samples must be drawn by disinterested party, within 10 days after arrival and delivery. When at point of origin, samples can be drawn by buyer's and seller's representatives, if mutually agreeable, or by disinterested party. Samples must be drawn within five days after date of disagreement.

Samples must be taken from three places from each head of the bale (six pieces) and regardless of size or condition of each piece of sample, it must be understood to represent approximately one-sixth of the bale. The sample representing each bale shall weigh approximately 8 ounces.

Samples must be securely sacked, sealed, and sent to arbitration board within 48 hours after being drawn.

Passage of title.—Where contracts of sale, covering cotton linters, cottonseed motes, grabbots, etc., specify "f. o. b. cars," the material covered thereby will not become the property of buyer until actually loaded into cars at point of origin and covered by railroad bill of lading. (See exception.) If such material is destroyed before contract terms are completed, seller may replace and buyer may demand replacement, the time limit and penalties in connection with such replacement to be as provided in rule 132.

(Exception. It is understood that where, by special agreement, partial or complete payment for material has been made by buyer, prior to loading into cars, title to such material passes to buyer with and at the time of such payment. Such material will be at buyer's risk of insurance and in case of destruction no replacement can be demanded other than under the common law.)

PREPARATION AND DISTRIBUTION OF COPIES

Copies of the standard grades for American cotton linters are prepared by the department and sold to the trade in the same manner as are copies of the cotton standards. The price has been fixed at $5 a grade. Because of the vicissitudes of use and the probability of alterations, the life of the copies as official copies has been limited to one year from the date of issue.

To facilitate export business in American cotton linters the department has placed copies of the standards, so that they might be available for reference, as follows: With the Liverpool Cotton Association, Ltd., Liverpool, England; the Syndicat du Commerce des Cotons au Havre, Havre, France; the Bremer Baumwollbörse, Bremen, Germany; and at the American Embassy, London, England.

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Management Plans

with Special Reference to

The National Forests

By

INMAN F. ELDREDGE

Forest Inspector
Branch of Forest Management
Forest Service

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MANAGEMENT PLANS: WITH SPECIAL REFERENCE TO THE NATIONAL FORESTS

By INMAN F. ELDREDGE, *Forest Inspector, Branch of Forest Management, Forest Service*

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INTRODUCTION

Forest management in America is gradually acquiring a character and color of its own. For many years foresters in this country were forced, because of lack of American experience, to preach and practice methods transplanted bodily from Europe. But when a background of actual practice and a better understanding of the silvicultural and economic factors peculiar to this country had been acquired, there came about a general realization that we could not begin where Europe left off; that we must, to a certain degree at least, meet American conditions with American measures.

Basic principles of forest management developed in Europe after centuries of trial hold as true in this country as they do abroad; it is in the application of these principles to our very different circumstances that the need and the opportunity for adaptation and invention have arisen. The appreciation of this fact has had a stimulating effect; and, freed for the time from the constraint of strict conventionality, foresters all over the country have been making marked

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progress in developing methods of management fitted to American economic and silvicultural conditions.

In this publication is presented a general exposition of one phase only of forest management—the making of the plan, and that mainly as it relates to the national forests. While the primary purpose of the bulletin is to aid national forest officers who are charged with the responsibility of making or carrying out management plans, it is hoped that the treatment of the subject will be of interest to foresters generally.

MANAGEMENT PLANS IN GENERAL

Timber is a long-time crop. To grow a stand of timber to merchantable size from seed takes a century or more and requires the work of a long succession of forest managers. It would be futile for short-lived man to attempt to grow a crop that outlives him by so many decades if the progress of the project were left to the expediency of the moment or to the whims of the successive individuals in authority. While individual managers, each as his turn comes, must accept full responsibility for the details of application, and while there must be given to each man great leeway for the exercise of judgment, initiative, and skill, the project can not be a success in the end unless all hold in common the same vision and carry forward through the successive stewardships the same purposes and policies.

The complexity of the situation is easily appreciated when it is realized that, nearly always in the national forests, the forester has in the territory under his charge a dozen or more timber crops in all stages of development from seedling to sawlogs, in all shades of condition from thrifty to decadent, and all affected more or less by conflicting silvicultural needs and by inaccessibility, inferior species in admixture, poor or fluctuating markets, insect depredations, and fire losses.

Without a definite plan it is virtually impossible for a succession of foresters, no matter how well equipped they may be individually, to manage intelligently and successfully over a long period of years the timber resources of a forest region. On every national forest all of the more important phases of work are guided and controlled through the use of plans and schedules. There are grazing plans, whose purpose it is to bring about systematic and profitable use of the forage; there are improvement plans, road plans, protection plans, land-exchange plans, and work plans, all of which represent steps toward systematizing and coordinating the work of the service, to the end that its effectiveness may be increased and that continuity of action, so essential in any large project, may result.

A management plan, as the term is used in the Forest Service and in this publication, concerns and is confined to the development and the disposition of the timber crop, and differs from a working plan in that it does not cover, in planwise fashion, forest planting, protection, grazing, improvement, and general administration. These important phases of forest work are all taken into account in the preparation of a management plan but only so far as they are related to the treatment and marketing of the timber crop.

WHAT THEY CONTAIN

Usually a national forest as a unit is too large and exhibits too great a complexity in conditions to permit of management of its timber resources under one plan; it must be divided into smaller areas or working circles in which the conditions of timber growth and utilization are more susceptible of analysis and appraisal. Management plans are made for working circles; and for these areas they set out a description of the area, the timber, and the economic situation; a delineation of the objects of management; a statement of the policies of the administration in handling the timber resources; a determination of the amount of timber to be cut, the period in which it is to be cut, and the manner in which sale areas will be located; and, finally, a budget or list of those specific areas from which timber is to be sold during a given period, usually 5 or 10 years. Such plans, while brief and simple in their treatment and as specific as possible in prescriptions for action, do not attempt to give in detail the action to be taken by the forest supervisor in the conduct of his timber business. Only the controlling essentials, the high spots as it were, are touched upon.

THE PERIOD COVERED

Economic developments in the national forests generally are occurring so rapidly that conditions can not be foreseen with enough clearness and confidence to justify the making of definite provisions for cutting for a full rotation ahead or for even a considerable part of one. It is to be expected that utilization policies and plans will have to be changed as the situation changes, and it is not practicable to attempt commitment, except in regard to general policies, for more than a very few decades in advance. Even in the most intensively managed working circles in the national forests the cutting budgets are seldom made to cover a period of more than 10 years, and they are frequently made for a 5-year period. Where the entire cut of a working circle is taken by one or two operators under long-time contracts, the situation is much simplified and action can be planned with considerable definiteness for a longer period.

PERIODIC REVISION

The periodic revision of the cutting budget and the occasional overhauling of the expression of the policies are necessary in order to keep the plan alive, in tune with circumstances, and practicable of application. Better data on growth and volume, or changes in marketability, may force revision. Except in the case of false premises or of a failure to appraise the situation correctly in the original plan, periodic revision should not change the general course of management; the main objects of management are carried forward intact as are the major policies of the administration.

MUST BE PRACTICABLE

A management plan must stand two rigid tests—one as to its technical soundness from the standpoint of long-time management—that is, whether it can produce the desired results in the long run;

the other as to the practicability of its application. No matter how clear the vision of the maker of the plan, no matter how logical and technically sound are his prescriptions, his plan will remain only a literary effort if it can not be put into action in the woods through the medium of the lumberman's ax and saw.

BUSINESS JUDGMENT MUST ENTER

Nor should the forester who is planning his timber management underestimate the extent to which sound business judgment must enter into and color his findings. The harvesting of the mature crop is not solely a silvicultural operation, it is a commercial transaction as well. Here he enters the commercial field and must plan his actions with an understanding of the customs and the rules of the business world. In the allocation of his cut to specific areas and to certain periods of time it is not only his opportunity, but his responsibility, to exercise a high quality of salesmanship in order that he may get for his product its full value in dollars and cents, and in order that he may bring the weight of legitimate business strategy to bear on the buyer to take the forest's offerings as budgeted.

WHEN NEEDED

It is not a difficult matter to decide when a management plan is needed for a given working circle; the decision is based wholly on common sense. In general, it might be said that a plan is not needed unless and until it is possible to put the prescriptions of a plan into action. There are some exceptions to this rule of thumb but not many. A working circle remote in location and time from active demand by lumbermen rarely needs a management plan. One whose resources are being used to such a small extent that the drain upon it does not represent anything approaching the sustained yield possibility will need a management plan only when the nature of the business that does exist threatens to complicate the situation for future utilization, or when the situation seems ripe to try for a much larger business. It goes without saying that a management plan is needed in all working circles that are shortly to be opened up for utilization on a scale commensurate with their resources and possibilities.

WHO SHOULD MAKE THEM

Naturally, since a management plan is a serious commitment to a definite line of action over a considerable length of time, it should be made by the man most familiar with all angles of the situation. In the Forest Service this is usually the forest supervisor. It is vital to the success of a plan that it represent something that can be done. No other man is as well equipped to contribute the element of practicability as the supervisor; for he knows the limitations imposed and the opportunities afforded, on the one hand by the calls on the time of his force and on their training and capacity for timber work, and on the other by the character, needs, and tendencies of the people and industries that the forest is to serve and that must be depended upon for a market.

While, of course, he will employ members of his force and such other assistance as he needs or can get in making an inventory and

maps, collecting growth and yield data, and arriving at an appraisal of the economic situation, the supervisor, himself, must bring his judgment into play in drawing up the plan of action to which he is to commit the working circle. A plan of action that is the child of his brain will naturally receive a much more enthusiastic support from the supervisor than any plan that is handed to him from above. By the same token the interest of that "ultimate producer," the district ranger, is enlisted largely in proportion to his participation in the making of a plan which involves part or all of his district. It may be expedient at times to have a district office man or a subordinate on the supervisor's staff draw up a plan without participation on the part of the supervisor, but it must be recognized that in so doing an element of weakness is introduced that may seriously cripple the plan.

AN AID TO ADMINISTRATION

Though the managing forester is definitely committed under a management plan to certain outstanding objectives and policies, and, for a shorter period, to certain definite lines of action, the general effect of the plan is not cramping or restrictive. On the contrary, it leaves him free to exercise all the initiative, all the business ability, and all the professional skill at his command. In his administration it gives him the security that comes of traveling a charted course and the confidence and strength that springs from a knowledge that the action proposed has been approved in advance by those officers above him to whom he must look for support.

THE PREPARATION OF MANAGEMENT PLANS

In preparing a management plan for a working circle the problem is attacked somewhat in this order:

1. Divide the forest into working circles.
2. For the working circle concerned obtain and assemble all pertinent data and maps for study and analysis from every angle.
3. Decide on the objects of management.
4. Determine the silvicultural system or systems to be used.
5. Calculate the yield.
6. Formulate the policy to govern the timber-sale business.
7. Choose the areas from which the timber is to be cut during the first cutting period and list them in budget form.
8. Present the plan in the form of a concise report accompanied by maps and pertinent data.

DIVISION INTO WORKING CIRCLES

The average national forest, including as it does about a million acres, does not lend itself readily to timber management under a single plan. The diversity of topographic, silvicultural, and economic conditions, and the number and complexity of the various influences that affect the growth and the utilization of the timber in such a large area, are almost certain to defeat all attempts to visualize the situation and reduce the problem to its fundamentals. A plan covering a whole forest would be either so vague and generalized in its provisions as to be valueless or so complex and formidable that it could

not be put into effect. The forest should be broken up into logical units of management in each of which the situation is sufficiently simple to permit a reasonably accurate analysis and appraisal and the drawing up of specific provisions for management.

The working circle is the management plan unit; it is a major territorial division of a forest in which the conditions affecting the care and use of the timber crop are so interrelated that the area can and should be managed as a whole and under a single plan, and usually though not invariably under sustained yield.

SIZE AND BOUNDARIES

Working circles may vary in size from a few thousand acres to several hundred thousand acres. The area and the location of boundaries will be governed by many factors, among which may be mentioned: The objects and the intensity of management, the quantity and character of output desired, the topography, the lay-out of transportation systems, the sphere of influence of near-by industries or communities from an utilization or market standpoint, and, to a lesser extent, the composition of the stand as to types, age classes, and sometimes species.

Since most of these factors in a mountain country are strongly affected by topography, it frequently though not always happens that a working circle is a natural topographic area, such as the watershed of a river or large stream, or a group of such areas. There is some tendency in the national forests to include too extensive an area in a working circle. While no hard and fast rule can be cited, it is good practice to keep the area as small as the attainment of the objects of management and the exigencies of practicable logging will permit. The smaller the management-plan unit, the greater the chance for uniformity of conditions, the easier it is to appraise the situation correctly, and the more practicable it is to apply the prescriptions of management.

It is not necessary that a working circle consist of a consolidated territory within an unbroken boundary. It may be made up of several watersheds or blocks of forest land separated from each other by bodies of private land, land outside of national forest boundaries, or nontimbered lands, but in all such cases there should be something in common that establishes an interdependence between the scattered areas, as for instance, a common shipping or marketing point or a common transportation system.

Whether or not the boundaries are drawn to exclude bodies of land in other ownerships within the topographic area constituting the working circle will depend upon the relative area of such lands, upon the degree and stability of cooperation which is in effect or assured, upon whether or not the timber on these lands is to be taken into account in figuring the yield, and, for a national forest working circle, upon the policy of the Government as to acquiring title to them under the general exchange act or otherwise. As a general thing the presence of intermingled alienations in a working circle should not affect the location of its boundaries. The effort should be to have all owners join in carrying out a common plan.

The boundaries of working circles should, as far as possible, be well-defined topographic features. They need not coincide with

those of an administrative unit such as a ranger district, although the execution of the provisions of the plan may sometimes be simplified if this is the case. A working circle may be located in two or more forests, although this interposes obvious administrative difficulties and requires that one or the other forest staff be made responsible for general oversight over the progress of the plan and for keeping the necessary records.

It is desirable but not always practicable to establish the permanent boundaries at the start. We are now in the first stages of systematic management in the national forests, and our present understanding and knowledge of the many and complex factors involved is not always a sufficient basis for permanent delineation. It will undoubtedly be necessary to make many adjustments in boundaries as we get more information as to our resources and better crystallize our ideas on management. There will be a tendency to reduce the size of management units, both working circles and compartments, as management becomes more intensive, because of better transportation facilities, better markets, and closer utilization.

ORGANIZATION OF THE WORKING CIRCLE

For ease in visualizing and analyzing the problem, for clearness and definiteness in describing the forest growing stock, and for convenience in allocating operations and in keeping records of action taken, working circles are subdivided into blocks, compartments, and subcompartments. The division into compartments is best made on the ground at the time of the timber survey, so that all field data can be taken and assembled by compartments. Some compartments may be divided into subcompartments in the field at the same time. The process of setting out subcompartments, however, is a progressive one and will continue throughout the course of management. The formation of blocks can perhaps be decided upon better after the plan of management has been at least roughly shaped up.

THE BLOCK

The simplest procedure is to divide a working circle area directly into compartments and subcompartments. There crops up, however, in some cases the need for a unit intermediate in size, between a compartment and a working circle, a unit that will make possible a clearer statement of the policy to be followed in handling the resources in the woods and in keeping the records in the office. In Forest Service practice this unit is the block.

The block is a large division of a working circle, usually with topographic boundaries, consisting of a group of compartments or an undivided area distinguished from other areas by a marked difference in timber-sale policy, utilization or transportation possibilities, silvicultural treatment, or otherwise. If two or more noncontiguous areas make up a working circle, each of these areas needs a name for convenience of reference and would be called a block. A block might also consist of a large sale area, either existing or proposed, covering several compartments; or it might be a remote part of a working circle which is not to be utilized for many years and which is not in immediate need of subdivision; or it might consist

of several compartments which, under the timber-sale policy, are set aside as a reserve from which to supply an established sawmill plant after the completion of the current sale.

In very extensive plans based upon meager data and lacking a good topographic survey, all immediate needs may sometimes be satisfied by dividing the entire working circle into blocks without further division into compartments or smaller units.

The block is a division of convenience. It is not necessarily permanent and there need be no hard and fast rules to govern its use. For the sake of simplicity its use should be restricted to situations where a real need is to be served.

THE COMPARTMENT

The compartment is the forester's working unit of area. He plans and executes his operation by compartments or subdivisions thereof; he describes the forest stands, keeps an inventory, and records action taken, by compartments. The compartment is a permanent territorial division and its boundaries should be located with care and a full realization of the very practical purpose which it is to serve.

Needless to say, compartment boundaries should be plainly and permanently marked on the ground and clearly shown on all maps. The areas should be so designated that they may be readily identified on the ground and on the map. Wherever available, natural topographic features such as ridges, streams, cliffs, lake shores, etc., should be used to mark compartment boundaries. These may be supplemented by roads, trails, and property lines. A cove, a gulch, a hollow, or the watershed of a small stream makes a very logical, easily identified compartment.

In a level country or in a region where marked topographic features are lacking the rectangular system of the public land survey gives a very convenient basis for division into compartments. The section of 640 acres makes a compartment of convenient size and one that is easily found and identified on both the ground and the map.

Compartments need not be logging chances or sale areas, nor need they be uniform in the type, age-class, or condition of the stand. All such features are taken care of in the subcompartments.

A compartment may vary in size from less than a hundred acres to several thousand acres, depending upon the degree of refinement used in silvicultural treatment, and upon the size of the natural topographic units that characterize the terrain. If the compartments are too large, it becomes difficult to describe the forest land adequately, to allocate the various operations, and to record their history. If the areas are too small, there is introduced a needless and hampering complexity in management.

SUBCOMPARTMENTS

If the intensity of the management or the diversity of forest conditions call for it, the compartment may require division into smaller units. Subcompartments may be topographic divisions but are usually based upon the type, age class, or physical condition, or the prescribed treatment of the timber stands. For instance, a smaller

area covered by young growth or an old burn or a different forest type would be set out as a subcompartment. Again, the subdivision may be based on logging chances or timber sales.

A complete division into subcompartments does not have to be made at the time that management is initiated; from time to time there will be need to subdivide as sales are made, fires occur, and other conditions come about that change the character of a part of the stand in a compartment. The number of subcompartments will be in direct proportion to the intensity of management, to the length of time that a given area has been under systematic treatment, and to the complexity of the composition or character of the stand. Well chosen subcompartments show for themselves on the ground and usually need no artificial marking of their boundaries; the boundaries should, however, be shown on the map.

DESIGNATION OF UNITS

In the designation of blocks, compartments, and subcompartments on the ground, on maps, and in reports, it is good practice to give names to blocks and compartments, usually suggested by outstanding topographic features, and to number or letter subcompartments. However, in working circles in which the terrain is cut up into many small gulches and in which timber sales are of small size, subcompartments may sometimes be given names that identify them with the topography.

Where the public land survey is the basis of division, management units may be designated by townships, ranges, and sections.

COLLECTION OF DATA

The complete and intensive plans presented as models in the textbooks require a formidable array of accurate field data. Much of this information is of a kind that can be accumulated only after years of investigation and experience. In many of the national forests there is a decided shortage of such essential data as regional yield tables, tables of growth by species or types, and stock and stand tables for various types.

In many national forests the immediate need of the public for timber is too pressing to permit the shelving of applications until complete and satisfactory management-plan data are obtained. To meet this situation, which bids fair to continue for some time, some plan is needed at once even though complete and comprehensive data are lacking. It remains essential, nevertheless, that the principles of sustained yield, proper silviculture, and sound economics be safeguarded and that the course of exploitation in every working circle be directed along lines that will at least lead in the right direction.

It is entirely possible to construct plans that will not only serve all immediate needs, but will at the same time initiate systematic management, on the basis of a rather meager showing of fundamental data. A simple plan, the primary purpose of which is to provide for the cutting of the various stands of timber in the order indicated by their silvicultural needs and the dictates of good business judgment and in a manner that will assure satisfactory repro-

duction—all without risk of a hiatus in the future production—can often be made upon information gathered in a rather extensive survey of the area involved.

The following is an outline of information needed as a basis for a simple plan:

1. PHYSIOGRAPHIC FEATURES

The topography, soil, and climate in the working circle have a direct bearing on the reproduction, growth, and utilization of the timber stand, and these natural factors should be analyzed in this relationship and all important features ascertained and recorded. Topographic features will, of course, be shown on the map.

2. FOREST STAND

The essential information needed is:

(*a*) The location, boundaries, area, composition, and condition of each of the commercial forest types in the working circle.

(*b*) The location, area, composition, and merchantable volume of stands of timber that are likely to be considered for cutting in the first cutting cycle.

(*c*) The proportion of the various age classes (in the case of partial cutting) in the timber stands by area, by volume, and by number of stems. This information may require the preparation of stock and stand tables for each type, though sometimes a good estimate based upon a few well-chosen sample plots will meet all immediate needs.

(*d*) A knowledge of the rate of growth to be expected per acre after the removal (in the case of partial cutting) of the mature timber according to the marking policy. For immediate practical purposes growth data based on systematically taken increment borings will serve until more accurate and complete figures are obtained from extended studies.

Data concerning the location, boundaries, area, composition, condition, and volume of timber stands should be so taken in the field that they may be recorded by compartments.

3. THE UTILIZATION SITUATION

In many cases, particularly in the national forests, the management of the timber resources for the next 10 years or longer will be governed by the possibilities of profitable utilization. It is essential, therefore, that the forester analyze this side of the general situation with considerable care. The judgment of a first-class logging engineer is of value in this analysis. A systematic study should cover such points as: Products to be disposed of, local and general markets, responsibility to local industries and communities, transportation facilities, methods of logging, labor supply, freight rates, effect of competing stumpage, possibility of correlated industries, etc. This information is used also in formulating the business policy to govern the disposition of the products of the working circle. Frequently, a brief statistical statement of the cut on the working circle during each of the last 10 years indicates the amount and steadiness of the present market demands.

4. OTHER INFORMATION

Any plan for the management of the timber resources that is not in entire coordination with the plans and policies for the various other uses of the land in that region is incomplete. The land-acquisition policy often has an important bearing on the handling of the timber in a given working circle. The use of the range for grazing is in many regions of great economic importance, and though it may sometimes conflict with the forester's plans for handling the timber, usually the two uses can be so coordinated as to make them both possible. In some regions the public has come to make very general and in some cases rather intensive use of forest areas, particularly the national forests, for recreation, including touring, camping, hunting, fishing, summer homes, etc. Such a use is a legitimate one and should be anticipated and taken into account in plans for timber management. The protection of city watersheds and of large catchment basins depended upon by irrigation districts for water supply is another use that must in many cases be fitted into the plan.

While management plans usually do not cover the field of protection in any detail, it is of paramount importance that in drawing up provisions for management, the protection of timber crops, both present and future, against insects, tree diseases, and fire should be kept constantly in the foreground in order that no opportunity for furthering the safety of the stands may be overlooked. Data should be gathered on the relationship of age classes, silvicultural systems, and logging methods, and on the liability of losses from insects, disease, fire, and storms.

5. MAPS

Of course, every forest manager wants a good topographic map of the territory in his charge, and as his work gets more intensive the need for an accurate map of this kind increases. At the start, however, large areas can be put under successful management without other than simple, inexpensive maps. A map showing ownership, drainage, outstanding topographic features, such as divides, transporation facilities, utilization plants, and towns and settlements, will usually serve as a satisfactory base on which to enter type lines and compartment and block boundaries and to show in bold relief the areas to be cut over during the period covered by the cutting budget. The scale of the map should be in proportion to the amount of detail to be shown; 1 inch to the mile will do for large working circles with very simple plans; 2 inches to the mile will better fit conditions in a smaller working circle or one in which there are more details to be shown; an intensive plan or a very complex situation may require a scale of 4 inches to the mile, or even larger. Often all of the data necessary can be shown on one map. Only in the more complex situations will separate type maps and ownership maps be necessary.

OBJECTS OF MANAGEMENT

A decision as to objectives is essential at an early stage in the preparation of the plan. After the information concerning the area to be put under management has been gathered and digested, the next step is to formulate and set down the purposes of management—

what the plan is designed to accomplish. When the aims of management are clearly understood, the making of a plan is greatly simplified.

The statement of purposes should include:

1. The chief products to be grown, such as saw logs, ties, mine timbers, pulp wood, or naval stores.

2. What markets are to be supplied—general, local, or both.

3. The part which the output of the working circle will play in local economics; the size and kinds of permanent industries that can be supplied; the communities that will be stabilized; and the need for securing new industrial undertakings to use the allowable cut and to enlarge the existing communities, or the necessity for a reduction in the local industries to a scale that will make it possible to supply them with timber permanently—in general, the responsibility of the management so to handle the timber resources as to give the greatest permanent local industrial benefits.

4. Whether conditions now permit the adoption of sustained yield or of only a continuous yield fluctuating in volume. In some unusual cases plans can now be made for nothing better than a periodic yield.

5. The changes in the proportion of age classes or in the composition of forest types which are desired and which are or may become practicable.

6. The indirect forest benefits to be maintained or bettered, such as watershed protection or recreational attractiveness.

7. The permanent transportation facilities which can be brought in or maintained by the wise handling of the timber resource.

SILVICULTURAL TREATMENT

The aim of silvicultural treatment in the national forests is to leave each cut-over acre in the best possible condition for the production of a succession of crops of timber, each crop approaching as near as professional skill can bring it to the full productive capacity of the site and type. The silvicultural treatment to be prescribed for each of the forest types will, of course, be chosen to fit in with and carry out the objectives of management. As a rule, satisfactory silvicultural methods have been worked out for each of the major commercial types in the national forests. For such types it is usually necessary only to decide which of the conventional methods will best fit the situation, but often the marking policy and instructions will need modification in order to meet the needs of the particular situation.

Management plans should not be made or construed so as to limit the continuous development and refinement of silvicultural practice. The forester often has serious limitations imposed upon him in his prescriptions for silvicultural treatment by the prevailing utilization practices based on local economics and therefore beyond his control. The situation may for the time being force a compromise between the desirable and the attainable. Such a situation, however, should not be accepted with complacency nor with the conviction that it will last forever. The last 20 years has witnessed remarkable advances in utilization; nearly every region has seen some or all of its "inferior" species come into active demand and its unmerchantable

sizes and qualities find a user. Even greater progress in this direction in the future is to be anticipated with confidence and the forester should be constantly on the alert to take advantage of every opening to bring about better silvicultural practice through higher standards of utilization.

REGULATION

In making a management plan it is in the section on regulation that the forester decides when and where and how much he is going to cut during the budget period ahead of him. It is obviously a very important part of the plan.

Nearly everywhere, both in virgin stands and in stands that have followed the unregulated cutting of pioneer days or are the result of old burns, the forest manager is faced with the necessity of converting as rapidly as may be through the use of the lumberman's ax, his very abnormal, often silviculturally stagnant, forest into an organized forest property that produces in accordance with the capacity of the site and has a more or less balanced representation of age classes. At the same time, he is seeking, in the national forests at least, to feed out the cut of his forest at a rate and in a manner that will approach as nearly as possible sustained yield, or at the least sustained operation.

Maximum production per acre and sustained yield are the forester's ideals, seldom reached in one man's lifetime, and never attained unless each man in the chain strives and plans to that end and hands the forest property over to his successor farther advanced than when he took it. To the extent that he can cut over each year a parcel of his working circle that represents the timbered area divided by the cutting cycle, just to that extent will he have an opportunity to put his forest into order and condition for maximum production and sustained yield.

Nevertheless, it is not always possible to figure out a sustained yield in the narrow sense of the term. The condition of the stand, as, for instance, in the case of a working circle where the growing stock is overwhelmingly overmature and decadent, may clearly indicate the necessity of cutting at a faster rate in the first cutting cycle than can be continued. Again, there are working circles where the great size of the necessary initial investment in transportation and utilization facilities demands a larger annual cut of timber over a period of years than can be maintained on a sustained-yield basis. The Forest Service is committed to sustained yield in the national forests as a policy and the principle is the beau ideal of every forester; every plan that is not cast on this basis must show convincingly that no stone was left unturned in the effort to solve the problem in favor of sustained yield and that the alternative adopted is the nearest approach to sustained yield possible under the circumstances. Abandonment of sustained yield because of silvicultural conditions is easier of defense than abandonment because of existing economic conditions, particularly in pioneer regions, for the problem may often be solved by the simple expedient of holding the working circle intact until the economic strictures are removed by a change in market requirements or industrial practices.

CALCULATION OF ALLOWABLE CUT

The literature of forestry is not lacking in the treatment of regulation, particularly the calculation of the yield. It is not intended here to go into the merits or demerits of the many and various methods that are in use or have been advocated by foresters here and abroad. Wide variations in forest conditions, utilization possibilities, and availability and character of growth data justify similar variations in the methods used in specific cases. In the management-plan work of the national forests in recent years there has been a marked tendency to get away from the use of formula methods of calculating the yield as a sole dependence. This is probably due to the fact that it has not often been possible to get together all of the information needed in sufficient detail and with sufficient accuracy to form a safe basis for such methods of calculation. Then, too, the silvicultural condition of the generally overmature virgin stands that characterize the national forests does not lend itself to methods of calculation developed mainly for stands that have been under management for many years.

If the forester is interested, as he usually is, in a course of management that will promise sustained operations without a hiatus in production and that will replace his poorly conditioned virgin stands with fast-growing, fully stocked second growth representing something approaching a normal forest, he will first find out over how long a period of time he must spread the cutting of his first crop of timber in order to allow the second crop to reach merchantable size and volume and take up the burden of supplying the needs of industry. Thus, except in forest types like Douglas fir on the Pacific coast that are cut clean and harvested only once in a rotation, the determination of the cutting cycle is an important step in the calculation of the allowable cut.

One rough-and-ready method of calculating the yield in selection forests, often used as a check on the results of more finished methods or used alone where the basic data for other methods are lacking, is as follows:

Assume an average diameter of merchantable trees and a volume per acre to represent a stand merchantable at the time of cutting.

Ascertain by increment borings or otherwise the number of years that it will take to bring the reserve stand left after removal of the first harvest up to the assumed size and volume. This is the first cutting cycle.

The total volume of merchantable timber in a type, minus the volume that is to be left for the second cut, divided by the number of years in the first cutting cycle, gives the annual yield for that cutting cycle and type. The sum of the allowable cuttings for the types is the total allowable cut for the working circle.

While the first cutting cycle is the only one used directly in the calculation of the yield for the first budget period, it is very desirable to carry the calculations through the second and remaining cutting cycles in the rotation. It is important because it applies a working test to the marking policy tentatively adopted and discloses any possibility of a hiatus or a change in yield in the future. Threatened lapses in yield may often be avoided or at least shortened

by an adjustment of the length of the first cutting cycle, or by a modification of the methods of cutting during the cycle, or both.

This method of calculating yield is crude indeed. It ignores a number of factors usually taken into account and should not be used if the necessary data for some more accurate method are available. The results, though conservative, are sufficiently accurate, however, to fill the needs of the simple plans that have been and are being made in many national forests, in which the chief concern is to set up a safe cutting program for the next 10 years and get systematic management under way and headed in the right direction.

For types that are cut clean, the cutting cycle coincides with the rotation age, and the determination of a rotation age is of great importance only for those types. Where partial cutting is used, the important factor is that there be left, in any present cutting, enough thrifty trees to produce a loggable cut of the desired products by the end of the cutting cycle. The present age of such trees or their age when they will be cut is relatively unimportant. If new even-aged stands are to be grown, however, sustained yield can only be secured by spreading the cutting of the present stands over the time required to grow a new forest to maturity on the area first cut over. As a general policy for the national forests, this rotation age will not be less than that at which the mean annual growth culminates, figuring the mean annual growth in terms of the chief product to be grown. Thus if Douglas fir saw logs is the desired product, and for the average site in a working circle the mean annual growth is greatest when the stands are 125 years old, the rotation will be at least 125 years, and plans must be made now to distribute the cutting of the existing stands over that number of years. If the working circle is reasonably uniform in site quality, a simple division of the productive loggable area by the number of years in the rotation is often the first step. Then multiplication by the average volume per acre for mature stands gives an approximation of the allowable annual cut. Refinements of the method should be used if justified by the available data.

TIMBER-SALE POLICY

When the annual possibility of the working circle has been ascertained and before decision is made as to when, where, and in what sequence the yield is to be harvested, it is in order to consider the policy that is to be followed in making timber sales; for only under unusual circumstances will it be practicable to order the utilization of timber stands solely in accordance with silvicultural needs. Accessibility, as it affects the cost of manufacture, quality in its effect on the value of the output, and policy as it relates to sound business practice as well as to public service, are and will be for many years to come, potent factors bearing on the allocation of the cut.

The statement of timber sale policy to be entered in the plan should be brief and to the point and should answer the following and similar questions:

1. What types of operations are to be sought: sawmill and logging, logging alone, combination of all commodities, separate operations for each commodity, etc.?

2. What logging methods and transportation systems are to be required, encouraged, or forbidden? Is there need for a progressive

development of the transportation system and how does this affect the order of cutting or the sale policy?

3. Are large or small sales or both to be sought? Long-term or short-term contracts? What number of operations is desired?

4. What should be the policy as to the use of small material, inferior species, and by-products? How far should the management go in forcing better utilization? Should concessions or adjustments in price for the better species be made for this purpose?

5. What attitude is to be taken toward the development of new business, new markets, and local industries?

6. What measures are necessary to maintain or develop competition between purchasers? What particular recognition should be given established operators?

7. To what extent should recreational and scenic considerations be taken into account in making sales?

8. What is the policy regarding sales at cost and free use of timber? Is a reserve for local use necessary?

THE ALLOCATION OF THE CUT AND CUTTING BUDGET

The cutting budget is the decision that follows the appraisal of the situation and the statement of objectives and policies. It is the summation of the plan and is a direct call for action. As written in the report, the cutting budget is a list of compartments, subcompartments, or chances to be cut under the provisions of the management plan during a certain period of years, in national forest practice usually 5 or 10 years. The areas to be cut are listed in the order of cutting decided upon after full consideration of the silvicultural condition of the various stands or tracts of timber on the one hand, and of utilization and policy considerations on the other.

In the management plans now being made in the national forests an attempt to list the areas to be cut each year during the budget period is seldom made, nor is it usual to provide for a certain volume of cut for each year in the period. It is the common practice to lump the cut, allocated to specific areas, for the budget period, with the understanding that the cut will be fed as uniformly as possible year by year. It is seldom that market and other conditions remain so fixed that the forester can dispose of his timber in an even flow year after year during any extended period.

THE BUDGET PERIOD

A definite commitment to a program of cutting involving both the time and the place of operations should be made for only as many years ahead as the forester can, with reasonable confidence, foresee the situation. It is better to lay out a five-year program based upon careful diagnosis of a known set of circumstances than to draw up a more pretentious budget covering a much longer period where the wish is father to the thought and a vivid imagination is the main dependence. The length of the budget period may be greater, obviously, in areas where the timber is sold in fairly large bodies and under long-term contracts than where the reverse is true. In the western national forests the cutting program is usually made for a 10-year period; in the eastern district 5 years is the usual budget period.

THE AREAS TO BE LISTED

There are many points to be taken into account in choosing the areas to be cut and in listing them for cutting. So far as it is practicable the silvicultural condition of a stand should be the governing factor in a decision as to its place in the cutting budget; the areas that are most overmature and decadent as a rule should be cut over first. Timber stands that are in good condition and are growing in quantity, quality, and price should be placed in future budget periods. Then, too, the forester should not lose sight of that ideal, the normal forest, and arranging the order and location of his operations should have constantly in mind an approach to normality in the next rotation.

But, as stated before, it is seldom that silvicultural conditions are the sole or dominating influences in the allocation of the cut. It is frequently necessary to build expensive and extensive transportation systems in a working circle. The progressive extension of such a system has to be taken into account and sales laid out accordingly. The future wants of existing operations have to be planned for and prospective sales listed with an eye to fitting those needs. Business strategy will often suggest an allocation and order of cutting designed to stimulate competition, to find a bidder for an undesirable tract, to force the clean-up of some relatively undesirable area, or to attract an operation of a certain desired type and character. In the national forests the harvesting of timber depends upon its sale to private enterprise and timber can not be sold unless some one wants it. Merchantability is an essential requirement for each area listed in the budget.

The chief purpose of a cutting budget, to bring about a systematic harvesting of the predetermined yield for the period involved, may be defeated, or at least impaired, if it is entirely inflexible. After all it is only a means to an end and is by no means sacred. All plans should provide that the managing forester keep the program under constant scrutiny and that he initiate steps to remedy or improve it as soon as a change in circumstances or the acquisition of new knowledge warrants a change. In order to give the man on the ground more leeway for good silviculture and the exercise of business judgment, it is frequent practice to put into the budget a number of alternative areas or to leave a certain part of the indicated cut unallocated by area.

With all the information and skill available it can not be expected that cutting budgets can be made, even for short periods, to anticipate every contingency that may arise—it is essential that ample provision be made to keep the program in harmony with circumstances. If the management plan is to come to anything it is essential that it be practicable; the budget is the direct contact between the idea and the action, and if it can not be put into effect on the ground the whole plan fails and the time, money, and thought put into its preparation are lost.

THE MANAGEMENT-PLAN REPORT

The way in which a plan is presented has much to do with its effectiveness and value as a tool of management. The purpose it is

designed to serve is comparatively simple, but the subject covered is broad and frequently complex. Considerable effort may therefore be required to present the plan in such a simple and direct way that those who are to translate the plan into action can get from it the essential things to be done without difficulty and without confusion.

THE THREE PARTS OF THE MANAGEMENT-PLAN REPORT

A management-plan report may be presented under three main chapters:

(1) The foundation, in which is contained a brief, well-balanced description of the governing conditions as they exist according to the best information available. Brevity should be attained by sticking closely to facts and conclusions concerning the essential elements only of the situation. This chapter is in effect the statement of the problem.

(2) The plan—a concise, direct statement of the objectives of management, the controlling policies, and the action to be taken. This chapter represents the solution of the problem.

(3) *The appendix.*—A systematic file of all of the information in the form of statistics, maps, etc., that has been taken into consideration in making the plan. In it also are placed discussion of alternative but rejected measures and calculations, detailed marking rules, silvicultural directions, and all other existing information to which the forester may need to turn to get a better understanding of the plan, to carry out the prescriptions of the plan, or to revise the plan. The appendix should be cumulative.

REPORT OUTLINE

In order that management-plan work might grow naturally and along lines dictated by conditions on the ground that there has been no effort made in the Forest Service to prescribe a uniform or official outline. A number of outlines have grown into common acceptance and use in the several national forest districts; the one given here as an illustration is fairly typical. It was developed in the southwestern district to fit the conditions prevailing there.

(1) FOUNDATION

Introduction.
Physiographic features.
    Topography.
    Soil.
    Climate.
Forest description.
    Types and silvical features.
    Situation as to fire.
    Summarized tables of area, volume, and status.
    Discussion of growth and yield.
Economic situation.
    Towns and communities—their relation to the forest.
    Wood-using industries.
    Markets.
    Transportation.
    Nonwood-using industries.
    The ownership situation.

(2) MANAGEMENT PLAN

Objects of management.
Silviculture.
    Methods of cutting.
    Methods of brush disposal.
    Methods of logging.
    Silvicultural studies.
Regulation.
    Rotation and cutting cycle.
    Calculation of allowable cut.
    Regulation policy.
    Sales policy.
    Cutting budget.
Administrative correlation.
    Exchanges, grazing, roads, recreational use, etc.

(3) APPENDIX

Detailed estimates and descriptions by compartments or other units.
Stock and stand tables.
Growth data.
Regulation calculations and discussion.
Detailed silvicultural directions by types.
List of existing utilization plants and capacity of each.
Maps.
Miscellaneous.

It has become customary in the Forest Service to submit a very brief summary of the plan proper as page 1 of the report. This summary presents at least the following information:

Name of working circle.
Location.
Area—timbered and nontimbered.
Stand—composition and merchantable volume.
Rotation and cutting cycles.
Silvicultural system to be used, by types.
Yield—average annual cut and total cut for a specified period, by volume and by acres.
Predicted periodic or annual cut in second cutting cycle.

In writing management-plan reports it should be kept constantly in mind that the objective is to give the man on the ground a clear understanding of what is to be done with the timber resources. The plan proper should contain only definite conclusions and is no place for recording observations, conjectures, arguments, or discussions. Such matters, if there be any, properly belong in the appendix.

THE CONTROL AND APPLICATION OF MANAGEMENT PLANS

To put a plan of management into effect in a working circle requires, (1) that the plan be practicable, and (2) that the local force have executive ability. Almost never will a plan be found that can be put into action and carried out without special and sustained effort on the part of the managing forester and his staff. The plan supplies to these men the necessary guidance in much the same way that the architect's plans and specifications guide the craftsmen whose skill and energy must be depended upon to bring the structure to completion.

CONTROL RECORDS

Systematic management can not long continue with any degree of success without some form of bookkeeping. Even the very simple management prescriptions that are in many of the plans for the national forests require that cumulative records be kept of operations in the woods. So far no entirely satisfactory set of control records has been devised and put into operation in the Forest Service, and this remains to be done, perhaps only as the result of experience, as the next step in systematizing management work.

Experience here and abroad has demonstrated that the best results in the way of keeping a record are obtained where simplicity is an outstanding feature of the system used. It would seem that reduced to this plane, the essentials are: (1) A progress map on which is entered with appropriate symbols the location, area, date, and character of each utilization or silvicultural operation; (2) a control sheet for the working circle by budget periods on which is entered a record for each unit of the time it was cut, the transaction under which it was cut, the amounts cut, the method of marking used, and the condition of the area after cutting. This may be placed on the same sheet as the cutting budget, or on a separate sheet facing the budget to make easy a comparison of the action planned with the accomplishment.

The above represents the bare essentials of a record for a simple plan, it will not, of course, serve the purposes of a cut-over land record, nor will it supplant detailed inventory or stock records. Its purpose is simply to record the progress of the work of carrying out the cutting budget.

KEEPING THE PLAN ALIVE

To the end that the management may be a progressive, growing thing, responsive to changes in circumstances and taking full advantage of every favorable opportunity, it is essential that steps be taken in a systematic way as rapidly as possible to remedy the lack of information that in the first place forced the making of an admittedly crude plan. As fast as greater knowledge is acquired or changes in controlling circumstances occur the plan of management should be amended, modified, or revised, if such action is called for. Periodic revision will undoubtedly be necessary in all plans. In many plans the need and the opportunity for improvement and growth will more nearly be continuous than periodic. To those to whom this thought may be disconcerting, because of their conception of a management plan as a fixed line of action to be followed through to the end, it may be recalled that forest management in this country is in its pioneer stage, that the transition from timber mining to organized forest harvesting is just beginning, and that any plan made now will be outgrown and discarded as a misfit in a few years unless it is kept plastic, flexible, and in complete adjustment with the ruling conditions.

APPENDIX

The plans that follow will, in addition to presenting certain management situations common to the national forests, show what data were assembled, how those data were used, and what solutions were arrived at in those particular situations. While all of these plans have received official approval and are in effect, they should not be regarded as models in either sense of the word. It goes without saying that the conditions that affect and control management are too varied and too complex and are found in too great a variety of combinations to make it likely that any of the plans given here would fit other specific situations to any satisfactory degree. And these plans are not perfect. They are merely samples of the work of the Forest Service in this field.

The plans have been edited only slightly, and that mainly through the deletion of statistical material from the appendices to save space. It has not been practicable to reproduce the original maps which accompanied the plans; there have been substituted small-scale maps showing the location and the boundaries of the working circles and some of the more salient features of topography and culture.

Though the plans are in effect, that for the Rio Pueblo working circle on the Carson National Forest is not being carried out in full because of an unexpected and probably temporary loss of market. Conditions there illustrate the importance of the marketing and transportation factors in managing forest properties. The Rio Pueblo plan has been included partly to picture the situation which confronts many national forest officers when they attempt to organize for sustained yield production forests which are difficult of access, from which only certain products can be sold, or which are dependent on unstable markets.

MANAGEMENT PLAN FOR CUSTER WORKING CIRCLE, HARNEY NATIONAL FOREST, S. DAK.

Respectfully submitted.

C. B. Webster, *Forest Assistant.*

Approved January 7, 1924.

J. F. Conner, *Forest Supervisor.*

Approved March 31, 1924.

A. S. Peck, *District Forester.*

Approved January 8, 1925.

L. F. Kneipp, *Acting Forester.*

SUMMARY

LOCATION

Harney National Forest. Principally in Custer County. A small area in Pennington County. All in South Dakota.

AREA (ACRES)

Timbered, 167,652;[1] nontimbered, 26,729; total, 194,381.

STAND

Volume of stand in trees 10 inches and over, d. b. h., 468,969,000 feet b. m. Composition, 100 per cent western yellow pine.

ROTATION

One hundred and forty years, divided into four cutting cycles of 35 years each.

PER CENT OF MERCHANTABLE STAND TO BE REMOVED IN FIRST CUTTING CYCLE

Seventy per cent by volume (approximate).

YIELD

Average annual cut, 7,000,000 feet b. m.; total cut, 1921–1930, inclusive, 70,000,000 feet b. m. The indicated acreage that can be cut over annually is 3,138 acres.

PREDICTED CUT IN SECOND CUTTING CYCLE

Twelve million three hundred and forty-six thousand feet board measure per year.

INTRODUCTION

The Custer working circle of the Harney National Forest is established to provide a sustained yield of timber for a permanent woods industry. This industry will insure a steady income for the towns within the circle. Directly or indirectly, a large portion of the population of Custer and adjoining terfitory is dependent upon the timber business for a livelihood.

Custer, the largest and most important town within the circle, has some 600 inhabitants. Originally the mining industry provided the principal source of income. To-day, however, only a very small amount of prospecting and assessment work is being carried on. No mines are running. There is very little promise of any considerable development in the near future. Next to logging and lumbering, ranching is the most important industry. There are no manufactories in Custer. It serves mainly as a supply center for the lumbermen and ranchers within the circle.

Pringle, the only other town in the circle, has less than 100 inhabitants and is of secondary importance. It serves as a supply point for the southern sawmills and ranchers and is a shipping point for cattle and lumber. Pringle is about 12 miles south of Custer on the Denver-Deadwood Highway and the Chicago, Burlington & Quincy Railroad. A sustained yield of timber will unquestionably benefit the town.

Assurance of a sustained yield within this circle will undoubtedly bring about the erection of a finishing or woodworking plant at Custer that will be able to handle all of the yearly cut of lumber. Such a plant will mean that the small operator need not depend upon the Chicago, Burlington & Quincy Railroad for a market, except for ties. Both large and small operators can sell direct to such a plant. There will be little tendency to ship their products out of the Black Hills. Better and closer utilization will result. Economic conditions in the circle will improve accordingly. The inhabitants are bound to be more prosperous.

The fact that most of the ranchers spend much of their time working at some other occupation clearly indicates that ranching is not a paying proposition on the whole, although it will undoubtedly always be carried on to some extent. Lumbering furnishes yearlong occupation, and an increasing number of persons desire to engage in it. A sustained yield of timber is therefore a very necessary adjunct to the economic life of the circle, and vitally important to the town of Custer.

[1] Includes 394 acres classified as inaccessible.

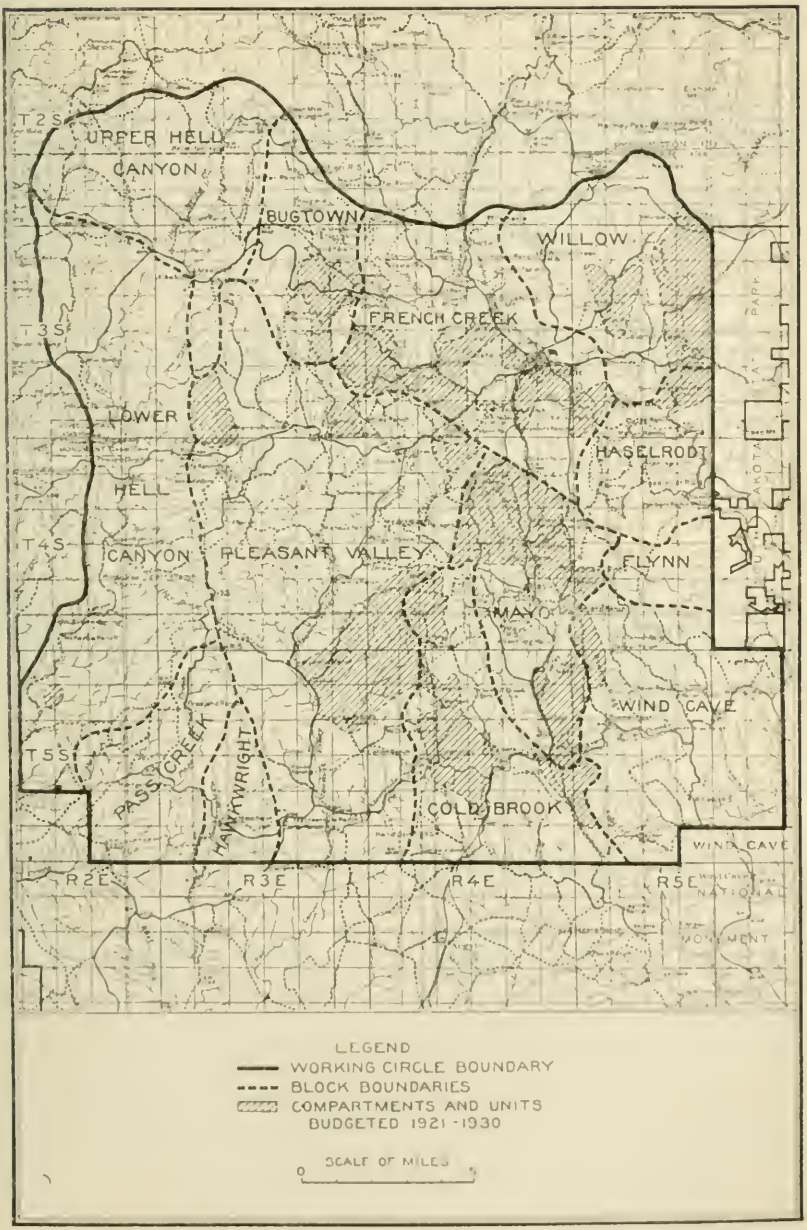

FIG. 1.—Custer working circle, Harney National Forest, S. Dak. Full division into compartments and units is not shown

OWNERSHIP OF TIMBER

With the exception of a small amount of timber on homestead patents, and some on mining patents, the entire volume is owned by the United States. The patented timber is so scattered that it will not influence the management of the national forest timber.

PREVIOUS CUTTING

Most of the timber cut within the Harney forest in past years has come from the Custer circle. The earliest cutting, done when Custer was first settled after the discovery of gold in 1874, was in the immediate vicinity of the town. Since that day cutting has been almost continuous, although the cut was small between about 1890 and 1920. The earlier operators removed only the very best of the timber and it has been possible to make second and even third cuts on the same areas. Some of the stands are still good producing forests.

PURPOSES OF THIS PLAN

The purposes of this plan are:

1. To bring together all available forest data necessary to construct and make workable a program that will insure a sustained yield of timber for the circle.
2. To determine what area and volume can be cut, and the time and place of cutting, to put the area on a sustained yield basis, insure the best use of the forest, and best serve the interests of the Government.

DESCRIPTION OF THE WORKING CIRCLE

TOPOGRAPHIC FEATURES

Location.—The Custer working circle includes those areas within the Harney National Forest drained by French Creek, Hell Canyon, Pass Creek, Hawkwright Creek, Pleasant Valley Creek, Carrol Creek, Cold Brook Creek, Willow Creek, Flynn Creek, and Beaver Creek. The circle boundaries are defined by topographic features and surveyed forest boundary lines. All or parts of the following townships are included:

T. 2 S., R. 2, 3, 4, 5 E., B. H. M.
T. 3 S., R. 2, 3, 4, 5 E., B. H. M.
T. 4 S., R. 2, 3, 4, 5 E., B. H. M.
T. 5 S., R. 2, 3, 4, 5 E., B. H. M.

The map accompanying this plan shows the location of the circle more definitely.

Acreage.—The total area of national forest land within the circle is 194,381 acres. Of this area, 167,258 acres are classified as accessible forest-producing land; 394 acres are classified as forest-producing land inaccessible for logging; and 26,729 acres are nontimbered.

Topography.—Six of the 10 creeks listed under "Location" flow to the south, joining other streams outside the forest boundary. Willow Creek flows south, but into French Creek which, together with Flynn and Beaver Creeks, flows east and southeast. The circle is, therefore, in general a slope to the south and east.

East of Pleasant Valley the country is characterized by high ridges with steep slopes, and narrow relatively flat valleys in between. From Pleasant Valley west, the limestone formation gives a country with relatively broad, flat-topped ridges, and narrow canyons with steep sides and usually with some rimrock. This is referred to locally as the "limestone." In all of the circle many side draws branch from each main draw. Pleasant Valley is a wide flat valley, but the side draws are of the canyon type common to the limestone region. The country in the immediate vicinity of Custer is rolling, with rock outcrop on the highest points.

The elevation ranges from slightly over 4,000 feet on the south side of the circle to over 6,000 feet in several places on the north side. The elevation at Custer is slightly over 5,300 feet. Pringle is about 4,800 feet.

The soil is rather shallow as a rule, except in the stream bottoms. On the slopes it frequently contains a large amount of surface and slide rock. There is more or less rock outcrop to be found on every ridge. The soil-moisture content varies from dry to fresh on the ridges and fresh to moist in the stream bottoms.

STAND

Small areas of white spruce (*Picea glauca albertiana*) and aspen are found in the central and northern parts of the circle. These species are not in sufficient abundance, however, to be of commercial value. The principal species is western yellow pine (*Pinus ponderosa*), which grows in pure stands over the entire circle.

The total area of forest-producing land within the circle, exclusive of the small amount of timbered private land, is classified as follows:[2]

Total forest-producing land, 167,258 acres; reproduction, 29,412 acres; poles, 28,008 acres; merchantable, 109,838 acres; inaccessible, 394 acres.

The average stand per acre on the area covered by merchantable timber is 4,270 feet b. m. The best of the timber is found in the central and northern part of the circle. Much of the stand in the southern part is of the scrubby foothill type. The total volume of accessible merchantable timber within the circle is estimated at 468,969,000 feet b. m.

Character of stand.—Three general age classes are found in the yellow-pine stands in this circle. These classes, with the type symbols generally used to designate them on the management-plan maps, follow:

Class	Symbol
1. Reproduction (under 6 inches d. b. h.)	1–20
2. Poles (6 inches and up to small thrifty "blackjack" trees)	20–80
3. Merchantable timber (10 inches and up)	80+
a. Mature and decadent, removed first cut.	
b. Thrifty to mature, removed second cut.	

There is very little, if any, mature timber over large areas of the Upper Hell Canyon and Bugtown blocks at the present time (1923) because of the depredations of the Black Hills beetle (*Dendroctonus ponderosa* Hopk.) between 1898 and 1910. Small patches of beetle-killed trees are found scattered throughout the circle. Good stands of reproduction have come in, however, in almost every area where the mature timber has been destroyed by this insect. There is little active infestation at the present time.

The best timber within the circle is found in the north central part of the Pleasant Valley block. Timber in the vicinity of Custer is good average pine for the Black Hills. The foot hills timber in the southern part of the circle is short boled, with a rapid taper. It grows more slowly than the average.

The mature and decadent timber, class 3a, is as a rule very defective. This is primarily due to rot entering through old fire scars at the base of the tree or through rotten limbs on the bole. Deductions in scaling timber cut in sales often amount to 25 per cent. After the first cutting cycle is completed, it is estimated that the deductions will be reduced to not over 10 per cent. This will have a marked effect on the volume obtained per acre.

Natural reproduction is very good over the entire circle. It is best, however, in the central and northern parts where growth conditions are most favorable. On many areas the reproduction is so dense that stagnation occurs after 15 or 20 years. Heavy, wet snows cause a large loss through deformity (snow bend) on such areas and have the same effect as a heavy but unskilled thinning. Except on the very worst burns, reproduction is almost certain to show up in three to five years after the fire. Even very bad burns, such as the one at Mayo, reseed as a rule in 10 or 15 years.

Cut-over stands vary considerably in silvicultural condition and volume, depending on the original stand. As a general rule, about 70 per cent of the original merchantable volume is removed. The following figures for timber

[2] These figures do not clearly indicate the true character of the stand, since the types are classified according to the predominating age class found on the area when cruised. Reproduction is found in varying quantities over the entire forest-producing area (with very few exceptions). Numbers of trees of the pole class are ordinarily found under the stands of mature timber. Such conditions are characteristic of the yellow-pine stands throughout the Black Hills.

10 inches d. b. h. and larger show the results on average acres, as determined by two different studies:

Studies by	Year	Average original stand [1]	Amount cut	Per cent	Amount left	Per cent
		Ft. b. m.				
Greeley and Granger	1915	5,600	4,164	74.5	1,436	25.5
Johnson and Tinker	1922	5,623	3,936	70.0	1,687	30.0

[1] Both these studies were made on areas where the average acre carries a larger volume than the average for the Custer circle. The areas carry, also, more than the average number of intermediates. In each case, however, an effort was made to pick areas that would give an average acre for the Black Hills region.

The growth in the virgin stands is practically nothing, decay in most cases being equal to and frequently greater than increment. The increment in cut-over stands amounts to 254 per cent in 35 years, according to predictions made on the basis of growth studies by Forest Examiner F. R. Johnson. (See Tables 2 and 4.) This is predicted on the assumption that growth continues at the same rate during the last 15 years of the cutting cycle as it does during the second 10-year period.

ECONOMIC SITUATION

ACCESSIBILITY

The Black Hills branch of the Chicago, Burlington & Quincy Railroad passes through the circle from south to north. Fair to good roads radiate in all directions from Custer and Pringle. Secondary and woods roads make almost every unit east of Pleasant Valley easily accessible. West of Pleasant Valley there are fewer roads, and on the average they are in poorer condition. Logging-road construction in the main draws is not difficult, as a rule. Feeder roads in the side draws usually involve heavier construction, with consdierable rock work, especially west of Pleasant Valley.

PRESENT AND FUTURE MARKETS

The towns of Custer and Pringle and the numerous ranches scattered throughout the circle offer a local market for a limited quantity of the lumber produced. The Burlington Railroad is now (1923) the largest individual purchaser of the timber products of the circle. This company buys railroad ties, coal and grain doors, and some bridge and structural timbers. The Warren-Lamb Lumber Co., of Rapid City, buys logs, mill-run lumber, and slab wood. In addition there is a more or less uncertain market for mine ties, mine timbers, fence posts, lath, and shingles. Fuel wood is always in some demand. The market for lath and shingles can be developed into a very good business if properly handled.

The sustained annual yield as fixed in this plan is more than sufficient to care for all present local demands. Should mining again become an active business there will be a marked increase in the local demand for all kinds of lumber and timbers. The allowable cut would still be more than sufficient for local needs, however. The surplus will in the future be used to meet the increasing demand from the prairie regions surrounding the Black Hills.

The future will also bring an increasing demand for box lumber. This will be supplied from any surplus remaining after the above-mentioned demands have been cared for. The surplus will undoubtedly be too small to supply the railroad demand. This will force the Burlington to turn to the lodgepole forests in the Big Horns for the products it needs, especially ties. Such a move will be very desirable from a Forest Service standpoint.

POPULATION AND LABOR SUPPLY

East of Pleasant Valley the circle is well populated, principally by small ranchers and stock growers. Stock raising is the principal occupation in the west part. Land suitable for farming is not so abundant there, and ranches are consequently fewer and more widely separated.

Woods and mill labor is generally obtained locally in sufficient quantities to supply the demand under the present methods and location of lumbering. However, imported labor will undoubtedly be necessary in the case of large operations in the western part of the circle.

COMMUNITY AND LOCAL NEEDS

At present the largest single local need is fuel wood. The per capita wealth of the circle is rather low at the present time. When this situation changes for the better there will be a need for building lumber of all kinds.

Fuel wood is obtained under free-use permit or commercial sale. Building material is obtained under regulation S–22, or by purchase from commercial operators.

TRANSPORTATION

The Chicago, Burlington & Quincy Railroad, Black Hills branch, offers the only shipping facilities to markets outside the Black Hills, except that operators in the extreme western part of the circle may find it cheaper to transport their products by truck to the Burlington main line, which roughly parallels the west side of the Harney forest between Edgemont, S. Dak., and Newcastle, Wyo. Ties and lumber are transported from mill to siding by motor or animal haul.

MILLS

At present (1923) there are 15 small sawmills operating more or less steadily within the circle, cutting principally national forest timber. One or two other mills cut intermittently in private timber and will eventually make application for national forest timber. All of these mills are in the portable class, with capacity varying from 5,000 to 25,000 board feet per day, log scale. All but one of these mills are located within a radius of less than 10 miles of Custer or Pringle. Many of them are within a 5-mile radius of these towns.

All of these mills can be permanently supplied with logs if they do not increase their present rate of cutting. They must, however, go further from the shipping centers for their source of supply in the future, until such time as the entire circle has been cut over for the first time.

There is an urgent need in the circle for a woodworking industry that can utilize the odd lengths, tops, and cull logs that are now largely wasted. A good box factory at Custer, built to utilize such materials, should be a paying proposition and will no doubt be erected at some future date.

SILVICULTURAL POLICY

1. Every effort will be made to place the forest-producing area in the best possible silvicultural condition.
2. Marking will be done according to the revised Black Hills marking rules. (In the original, reference was made here to the Appendix, from which the marking rules are omitted in this publication.)
3. All trees infested with the Black Hills beetle or similar insects will be marked for cutting, regardless of age or class, and wherever such trees are found an effort will be made to dispose of them immediately.
4. Young stands which need thinning will be given that treatment wherever market and other conditions make it possible. Forest officers making such thinnings must be thoroughly competent and must have written authorizations from the forest supervisor.

MANAGEMENT POLICY

OBJECTIVES

1. (*a*) To maintain a sustained yield of forest products for the use of the local people and, where a surplus is produced, for the general market.

(*b*) To furnish steady employment for the local people in woods work and in the manufacture of forest products.

(*c*) To maintain a permanent industry which will offer a market for timber as it becomes ripe for cutting.

2. (*a*) To cut over the forested area four times in the next 140 years, beginning from the year 1921, removing the mature, decadent, and defective timber in the first cut.

(*b*) To make such thinnings in young stands as are economically possible.

REGULATION OF THE CUT

1. *Rotation.*—A rotation of 140 years has been chosen as the basis for management. This period is based largely on figures of growth obtained by Johnson in cut-over stands in the Black Hills National Forest in 1922. Johnson's figures indicate a rotation of approximately 130 years. Pending confirmation of his calculations by continued studies during the next seven years, a rotation of 140 years has been adopted as conservative. (See p. 37 for growth figures obtained by Johnson.)

2. *Cutting cycles.*—The best growth figures available indicate that four cutting cycles of 35 years each during the rotation are feasible. In any case the 35-year cutting cycle for the removal of the first cut appears to be satisfactory, inasmuch as it provides for the removal of the decadent and defective timber as quickly as possible. Likewise it produces a yield sufficient to maintain established industries on a sustained yield basis, and furthermore, does not endanger continuation of a sustained yield through the subsequent cutting cycles. (See p. 30 for detailed calculations.)

3. *Allowable cut.*—Calculations to be found in the Appendix show that an annual cut of 7,000,000 feet board measure is possible. This volume limitation is therefore adopted to apply during the remainder of the period 1921–1930. It is not adopted for the entire cutting cycle for the following reasons:

(1) The accuracy of some of the timber estimates used in these calculations is doubtful.

(2) Within the next seven years a large part of the circle west of Pleasant Valley, which at present is not covered by accurate timber surveys or estimates, will have been mapped and cruised. The accurate data such a cruise will give may indicate that some changes must be made in the size of the annual allowable cut.

GENERAL PROGRESS OF THE CUT

The units listed in the cutting budget are those most in need of cutting, as determined by their maturity or by the presence of injurious insects. Qualifying factors considered in making the selections are:

1. Volume of timber available; practicability of mill settings.
2. Location, with reference to as equitable a distribution of timber-sale work among ranger districts as is possible.
3. Location with reference to present mills.
4. Accessibility.
5. Presence or absence of valid mining claims in unit.

Most of the cut for the first 10-year period will come from French Creek, Pleasant Valley, Willow, Mayo, and Cold Brook blocks in the order named.

TIMBER-SALE POLICY

1. The number and size of sales will be governed by the control budget and the foregoing policies.
2. Sales will be made with the idea of caring for established operators first and giving them a continuous cut. Thus bodies of timber near or adjoining going operations will be advertised only when the going sale is about completed.
3. The average annual cut for the period 1921–1930, inclusive, will not exceed the maximum of 7,000,000 feet board measure.
4. Until competition and demand become keener timber will be advertised only on application.
5. Units will be appraised on the basis of a mill of capacity sufficient to handle most efficiently the volume of timber being sold.
6. Sales to operators desiring to cut over 1,000,000 feet annually will be confined to Pleasant Valley, Lower Hell Canyon, Pass Creek, Hawkwright, and Wind Cave blocks, unless due consideration shows that an operation of such size in another block would best serve the interests of good forest management.
7. Sales made under regulation S–22 will be confined to small isolated tracts of timber that are not a logical part of a large unit, except that in cases where

this may prove impracticable definite S–22 areas will be established, the location to be approved by the forest supervisor before any sales are made.

8. In sales too small to warrant the travel and time for scaling, volume will be obtained, at the discretion of the forest supervisor, by tree measurement.

9. Sales of isolated patches of timber not listed in the control budget are permitted. Such sales must be approved by the forest supervisor.

10. An unallotted area will be left in the cutting budget to permit such sales as are mentioned in paragraphs 6, 7, and 9. When such sales are made the unallotted area in the budget should be reduced accordingly. Units coming under paragraph 6 will be listed in the budget as soon as timber-survey data are available—probably 1924.

11. All brush and débris resulting from timber-sale operations will be disposed of according to instructions in the District 2 Forest Management Handbook. This means disposal by piling and burning in most cases.

12. Any form of logging other than by animals or motor-propelled vehicles will be permitted only by special authorization of the district forester.

13. In case the logging operator does not remove cordwood or other by-products from the sale area, every effort will be made to sell such products to other operators.

14. If valid mining claims are known to exist in a logical sale unit and are so located that they will interfere with the logging or will necessitate the leaving of one or more tracts of timber isolated, the unit will not be budgeted until near the end of the cutting cycle. Before then the claims may be either abandoned or patented. Exceptions to this general policy may be made by the forest supervisor.

CUTTING BUDGET FOR 1921–1930

The cutting budget is given on separate sheets. For each unit a specific year has been designated as the time when cutting may be expected to begin. It is not intended that this should be a mandatory date, but rather that it should be a guide to the approximate time when the unit will be advertised for sale. It might become more desirable to sell in 1925 a unit that is listed for sale in 1928. When due consideration shows that such a change will bring greater benefit to the forest and to the United States, the change should be made. Authorization for such a change will not be necessary from anyone approving this plan except the forest supervisor.

Not all of the possible allotment is being budgeted by separate units. The unallotted balance will be used to care for unforeseen small sales and sales in areas not at present covered by intensive timber surveys.

Cutting budget, Custer working circle, Harney National Forest, period 1921 to 1930

Location			Plan				Record					
				Stand to be cut					Amount cut			
Block	Compartment	Unit	Government area	M feet b. m.	Year to start cut	Method, treatment, etc.	Time cut (year completed)	Sale	M feet b. m.	Cords	Cull logs, linear feet	Methods, remarks, and references
French Creek	V	Sec. 24, T. 3 S., R. 4 E., B. H. M.	6	20	1921	Regular. (See Marking Rules.)	1922	Mark Sheehan, Feb. 5, 1921.	20.06			
Do	V	Granite Reef	356	500	1921	do	1922	M. O. Connor, Mar. 10, 1921.	463.00			Excellent stand left over most of area.
Do	V	Custer R. S.	50	50	1921	do	1922	Paul Rosse, Mar. 24, 1921.	53.10			
Mayo	I	Norberg	55	123	1921	do	1922	Frank Nihart, July 29, 1921.	245.2			Good stand left.
French Creek	V	Custer R. S.	100	100	1921	do	1923	Paul Rosse, Aug. 13, 1921.	159.9	55		
Cold Brook	III	Pearson	40	63	1921	do	1922	A. M. Boggs, Oct. 11, 1921.	65.2			Old stand; heavy cut, cut over once previous; good reproduction on area when cut.
French Creek	V	116	10	22	1921	do	1922	J. H. Mayberry, Nov. 21, 1921.	22.9			
Haselrodt	I	Walsh	60	200	1922	do		J. H. Bostwick, Dec. 13, 1921.				
Willow	IV	Kneeland ranch	160	250	1922	do		F. V. Carrol, Dec. 13, 1921.				
Mayo	IV	West Beaver Creek	140	200	1922	Regular. (Scattered patches in burned-over unit.)		A. L. Duncan, Dec. 13, 1921.				
Cold Brook	III	Pearson	10	32	1922	Regular	1922	A. M. Boggs, Feb. 15, 1922.	32.2			Old stand; heavy cut much defect.
Mayo	IV	Sanatorium	40	135	1922	do	1922	J. H. Mendenhall, Feb. 18, 1922.	143.1			Good stand left.
French Creek	V	Part of 114	56	500	1922	do	1923	Fred Higgs, Mar. 27, 1922.	86.6		308	
Lower Hell Canyon.	II	Lithograph	30	50	1922	do	1923	M. J. Bailey, Mar 4, 1922.	52.90			Small part of unit; heavy cut; much defect.
Mayo	IV	Sanatorium	400	706	1922	do		Wm. V. Gould, June 13, 1922.				Transferred to Roberts and McCullough.

Wind Cave	I	Bowman No. 1	833	2,396	1922	do		Frank Nihart, July 1, 1922.			
French Creek	V	Reynolds pasture	10	24	1922	do	1923	J. H. Mayberry, Aug. 14, 1922.	19.6		70
Pleasant Valley	V	Nellie Merchant	450	1,100	1922	do		Myren O'Connor, Sept. 5, 1922.			
French Creek	V	White Spar	30	40	1922	do	1923	J. W. Hanes, Dec. 18, 1922.	67.38		
Pleasant Valley	IV	S. 2, NE. 4, sec. 9, Ts. 4–4.	8	20	1922	Regular	1922	J. H. Mayberry, June 6, 1922.	25		
Cold Brook	III	Pearson	116	304	1923	(All remaining mature timber scattered.)		A. M. Boggs, Jan. 25, 1923.			
French Creek	V	116	150	200	1923	Regular (ocular estimate).		S. E. Ainslee, Feb. 2, 1923.			
Pleasant Valley	IX, X	Long Draw	6,153	11,773	1923	Regular		F. W. Ward, Mar. 2, 1923.			
French Creek	I	Custer Park No. 1	109	250	1923	do		W. O. Mayberry, Mar. 25, 1923.			
Haselrodt	I	Walsh No. 1	182	970	1923	do		J. H. Bostwick, June 28, 1923.			
Mayo	I	Suterland ranch	610	2,127	1923	Regular. (Reappraised area. Time extended.)		J. B Barnes, May 12, 1920.			
French Creek	V	Susan placer No. 1	301	740	1923	Regular		Paul V. Rosse, Sept. 29, 1923.			
Do	V	E. 2, NW. 4, SE. 4, sec. 22, Ts. 3–4.	15	25	1923	Regular. (Isolated patches.)		Paul V. Rosse, Sept. 4, 1923.			
Cold Brook	I	Hay Draw No. 3	810	2,090	1922	Regular		L. D. Pitts, July 21, 1922.			
Willow	II	Maudlin No. 1	420	886	1923	Regular. Previous cutting before forest was established.)					
Mayo	II, IV	Sanatorium siding	1,123	4,363	1923	Regular					
Bugtown	III	Ilsley No. 1	436	940	1924	do					
Lower Hell Canyon.	III	Doran subunit No. 1.	70	150	1924	Regular. (Brush to be burned.)					
French Creek	V	168	247	750	1924	Regular					
Pleasant Valley	III	Warren Gulch No. 2	336	1,000	1924	do					
French Creek	V	White Spar No 2	52	177	1924	Regular. (Winter logging.)					
Pleasant Valley	III	Warren Gulch No. 3	200	775	1924	Regular					
Cold Brook	III	Cumming	223	375	1924	do					
Do	IV	Jack Rabbit	244	659	1924	do					
Willow	V	Squaw Creek	630	1,663	1924	do					
Do	III	Brown ranch	116	250	1924	do					
French Creek	V	Ilsley No. 2	119	1,346	1925	Regular. (Contract should provide for removal of cordwood.)					
Mayo	IV	Merchant	424	1,638	1925	Regular. (Heavy cut resulting.)					
French Creek	V	124	340	1,200	1925	do					

Cutting budget, Custer working circle, Harney National Forest, period 1921 to 1930—Continued

Location			Plan				Record					Methods, remarks, and references
Block	Compartment	Unit	Government area	Stand to be cut		Method, treatment, etc.	Time cut (year completed)	Sale	Amount cut			
				M feet b. m.	Year to start cut				M feet b. m.	Cords	Cull logs, linear feet	
Cold Brook	I	Albertson No. 2	362	864	1925	Regular. (Heavy cut resulting.)						
Mayo	III	Norberg South	249	955	1925	Regular. (Includes small area of Nihart unit lying in 40's 11, 12, sec. 1.)						
Do	II	McKnight	150	778	1925	Regular						
Willow	III	Doran	410	1,225	1925	do						
Pleasant Valley	VI	Wolf	717.2	2,007	1925	do						
French Creek	III	Sousan placer No. 2	180	693	1926	do						
Do	III	Sousan placer No. 3	516	1,960	1926	do						
Do	III	H. T. Graves	571	1,878	1926	do						
Willow	III	Smith	447	1,383	1926	do						
Do	III	Berkland	528	2,014	1926	do						
Wind Cave	IV	Hayden	70	230	1926	do						
Mayo	IV	Ayres	370	1,657	1927	do						
Cold Brook	I	Akes	35	66	1927	do						
Do	III	Blue Jay	286	445	1927	do						
Do	III	Carrol Creek	327	790	1927	do						
Do	IV	Cold Brook	399	949	1927	do						
Do	IV	Broadhead	437	898	1927	do						
Do	III	Loring	133	41	1927	do						
Do	IV	Hunter	76	187	1927	do						
Mayo	III	Upper Beaver	308	1,207	1927	do						
Cold Brook	IV	Pringle	78	201	1927	do						
French Creek	IV	Crow Creek	968	3,659	1928	do						
Total			24,182	64,819								

REVISION OF PLAN

A general revision of this plan will be made for every 10-year period and at the end of each cutting cycle. Minor revisions will be made every five years if conditions make it necessary. During the first 10-year period it will probably be necessary to check over and revise the plan at more frequent intervals, as more accurate data are obtained, or as points of importance are brought out that have been overlooked in the original plan.

Except as mentioned under "Cutting budget for 1921–1930," any changes or revisions made must have the approval of all officers approving the original plan.

There will be needed for the first revision of this plan:

1. More accurate data on areas and volumes of merchantable forest in those parts of the circle not covered by intensive surveys at the present time.

2. A check on the accuracy of the growth figures obtained by Johnson in 1921–22.

3. Additional figures showing actual volume left per acre in trees 10 inches and over d. b. h. on cut-over areas.

APPENDIX, CUSTER WORKING CIRCLE

Editorial note.—In addition to the tables here given the Appendix in the plan as submitted contains the following:

Description of working circle by blocks.
Marking rules for western yellow pine in the Black Hills and Harney National Forests.
Superseded marking rules for western yellow pine in the Black Hills and Harney National Forests in effect previous to 1923.
Volume table for western yellow pine in the Black Hills and Harney National Forests, by J. V. Leighou, 1916.
Normal increment in board-feet western yellow pine in the Black Hills and Harney National Forests, by Notestein, Smith, Phillips, and Bates.
Volume of national forest timber cut in Custer working circle by commercial saw-timber operators for the fiscal year 1923.

AREAS AND ESTIMATES (HOW OBTAINED)

Areas.—Figures given for the areas of various types were obtained from timber-survey data where such were available. For the areas not covered by timber surveys, data were taken from the land-classification maps by planimeter. Only approximate accuracy was obtained where the land-classification maps were used, since little or no distinction is made between the various forest types, such as reproduction, poles, and merchantable timber. The acreages obtained were divided among the various types in accordance with the best judgment of persons familiar with the region.

Estimates.—Estimates were obtained from timber-survey data where such were available. These data were available for the following areas:

T. 2 S., R. 3 E., sections 25 to 36, inclusive.
T. 2 S., R. 5 E., except sections 30 and 31.
T. 3 S., R. 3 E., all.
T. 3 S., R. 5 E., except sections 6, 7, 18, 19, 30, and 31.
T. 4 S., R. 4 E., except sections 1, 2, 3, 5, and 6.
T. 4 S., R. 5 E., all.
T. 5 S., R. 3 E., sections 1, 2, 11, 12, 13, and 14.
T. 5 S., R. 5 E., all.
T. 5 S., R. 4 E., all.
T. 4 S., R. 3 E., all.

For all other parts of the circle only land-classification data were available. The timber-survey estimates are reasonably accurate. The land-classification estimates are very rough, usually ocular and not sufficiently detailed to be of great value.

Since land-classification figures were used for almost half of the area within the circle, the area and volume figures obtained can not be regarded as thoroughly reliable. Hence a safety factor has been allowed in arriving at the allowable annual cut.

GROWTH AND YIELD

Fred Johnson, of the Denver office of the Forest Service, made detailed growth studies in 1921–22 on areas in the Black Hills that were cut over under Forest Service regulation 10 to 20 years ago. His final report is not yet available, but according to figures in his preliminary report, there is a volume increase on the average acre of 49.2 per cent at the end of the tenth year after cutting. At the end of the twentieth year the volume increase is 116 per cent.

Assuming that for the remaining 15 years of the 35-year cutting cycle the growth continues at the same rate as between the tenth and twentieth years, the total volume increase on the average acre for the 35 years following the first cut will be 254.78 per cent.[3] (See Table 4.) The volume on the area at the time the second cut begins will then be as follows (rounding off the increment per cent to 254 per cent):

Volume per acre, feet b. m.

Cutting cycle	Average original stand	Amount cut,[1] 70 per cent	Amount left, 30 per cent	Increment on stand left, 254 per cent	Stand next cut	70 per cent to cut next cycle
35 years	5,623	3,936	1,687	4,285	5,972	4,180

[1] Based on 8,619 acres containing merchantable timber, where 33,921,200 feet b. m. were cut.

ROTATION AND CUTTING CYCLES

Studies made by Notestein in uncut stands of Black Hills western yellow pine show that the average silvicultural rotation is 160 years in virgin stands. Notestein's studies have been recently supplemented by those of Johnson. The latter studied cut-over areas.

Johnson's figures show that after the first cut in the virgin stand there is a substantial increase in the rate of growth of the trees left on the area. This increase is so marked that we are apparently justified in setting the length of rotation at 140 years, with four cutting cycles of 35 years each. At any rate, we are safe in using a period of 35 years for the first cutting cycle, as is shown by the following:

It seems safe to assume that the rate of diameter growth attained between the tenth and twentieth years after cutting will continue for at least 15 years more. Then, at the beginning of the second 35-year period, trees which were 10 inches d. b. h. at the time of the first cut will have attained a diameter of 13.5 inches, and trees which were 12 inches will have increased to 15.5 inches d. b. h. There will be at least 16 trees whose diameter will be 15 inches or more (see Table 3). On the assumption that these trees average the usual three logs per tree, they will produce a volume of 4,019 feet when cut, as is shown in the following tabulation:

Volume at beginning of second 35-year period

Diameter class	3-log volume per tree	Trees per acre	Indicated volume per acre
	Feet b. m.	*Number*	*Feet b. m.*
15-inch	200	7.21	1,442.00
16-inch	225	4.41	992.25
18-inch	300	3.37	1,011.00
20-inch	395	1.22	481.90
22-inch	485	.19	92.15
Total		16.40	4,019.30

This is 161 feet less than the estimated cut for the next cycle, as given in calculation of "Volume per acre" under "Growth and yield." Sufficient vol-

[3] There is a divergence of opinion on the reaction that is obtained in the form of increased growth after the first cut. However, it has been proved that there is a marked increase in growth, and further data will be obtained. If it is shown by future studies that the increased growth does not continue to the end of the 35-year cutting cycle it may be found necessary to cut the increment per cent figure down, since it is desired to obtain maximum growth at all times. Growth in young stands can be increased many times over that now being obtained when economic conditions make it possible to thin such stands properly. It is thought that such thinnings can be started within 10 years.

ume will be obtained from trees less than 15 inches that are defective, suppressed, or otherwise in need of cutting, to more than make up this difference.[4]

The marking rules now followed in the Black Hills forests call for the removal of 70 per cent of the stand by volume, on the average. An inspection of cut-over areas in this circle leaves no doubt in the observer's mind that a second cut can be made in 35 years which (barring insects, fire, etc.) will yield all of the volume expected.

CALCULATION OF ALLOWABLE CUT

A good stand of poles or reproduction, or of both, is generally found under the mature stand. It is estimated that 75 per cent of the area bearing merchantable timber carries an understory of both reproduction and poles. Hence, age classes 3a and 3b will not have to be carried in the stand any longer than 70 years to prevent a hiatus in the supply of timber ready for cutting. This is brought out more clearly by the following calculations:

Table 1 shows that there is now an area of 109,838 acres bearing merchantable timber. On this area there is a volume in trees 10 inches and over d. b. h. of 468,969,000 feet board measure. In the first cutting cycle, approximately 70 per cent by volume of this stand will be removed. This volume will come from the mature, decadent, and defective trees. The calculation included under "Growth and yield" indicates that at the beginning of the second cutting cycle more volume can be cut than was removed during the first cutting cycle. This second cut will be obtained from the almost mature trees left at the time of first cut, and from the most mature of what are now thrifty intermediates.

By the end of the second cutting cycle 70 years will have elapsed. During this period the poles that were on the area at the time of the first cut will have increased in d. b. h. at an average rate of 1 inch every 10 years (refer to Table 3) and there should be at least 16 averaging 15 inches or over, d. b. h. Such a stand will be found on 75 per cent of 109,838 acres, or on 82,378 acres. In addition there is an area of 28,008 acres of pole stands, with reproduction underneath, that will contain mature timber at the time of starting the third cutting cycle. There will then be a total area of 110,386 acres from which to obtain the third cut of the rotation.

The fourth cut of the rotation will be obtained from the area of 29,412 acres now bearing reproduction, and from 75 per cent of the area now bearing merchantable timber, or 82,378 acres. Thus the total area that can be cut over during the last cutting cycle will be 111,790 acres, with a strong probability of an additional area from the 28,008 acres of present pole stands.

CALCULATION AND CHECK ON VOLUMES TO BE CUT

First cutting cycle.—At the present time (1923) 109,838 acres in this circle bears a stand of timber in trees the majority of which are 10 inches or over in diameter. Owing to the large amount of mature and decadent timber on this area, it is imperative that it be cut over in the first 35-year cutting cycle. This will necessitate cutting an area of 3,138 acres annually. The total volume in trees over 10 inches d. b. h. on this area is 468,969,000 feet b. m. Seventy per cent, or 328,278,000 feet will be cut. This is equivalent to 2,988 feet b. m. per acre. Rounding this figure off to 3,000 feet, the indicated annual allowable cut for the first cutting cycle is 9,414,000 feet b. m. annually.

Using Von Mantel's formula for a check on this figure, the following result is obtained:

Total volume of stand (468,969,000 feet) divided by one-half the rotation (70 years) equals 6,699,000 feet b. m.—the indicated annual cut allowable according to this formula.

In view of the discrepancy between these two calculations the figure obtained by Von Mantel's formula is rounded off to 7,000,000 feet b. m., and this figure is fixed as the maximum allowable annual cut for the first cutting cycle, subject to change at such time as additional data may show that a change is justified.

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[4] It is not intended here to convey the idea that all trees over 15 inches d. b. h. will necessarily be cut. Marking in all cases will be guided by the standard marking rules. It happens, however, that most trees over 15 inches d. b. h. are ready for cutting, and this gives a basis on which to check the next cut.

Second cutting cycle.—Volume remaining after 70 per cent cut in first cutting cycle is 140,691,000 feet, on 109,838 acres.

Increment on above stand at an average rate of 150[5] board feet per acre per year is 476,649,500 feet b. m.

Total volume from which to obtain second cut is 617,340,500 b. m.

Expected yield (70 per cent cut) 432,138,350 feet b. m.

Third cutting cycle.—This cut will come from an area of 28,000 acres of present pole stands and from 82,378 acres of the area now bearing merchantable timber and poles. This gives a total area of 110,386 acres. There should be a volume of accrued increment of 579,526,500 feet (even allowing a 50 per cent loss for death and decay on the area of the present pole stands). There should also be thinnings from other stands.

Fourth cutting cycle.—This cut will come from 29,412 acres now in reproduction and from an additional area of 82,378 acres now bearing reproduction and poles under mature timber.

Total area to be cut over in fourth cycle is 111,790 acres. This should furnish a cut at least equal to that obtained in the third cutting cycle.

While the estimates of future yield are based on figures that are at best only approximately accurate, these checks show that there is no danger of a hiatus as the result of the use of the sustained yield figure of 7,000,000 feet annually during the first cutting cycle.

The cutting cycles will include the following years during the first rotation:

First cycle, 1921 to 1955, inclusive.
Second cycle, 1956 to 1990, inclusive.
Third cycle, 1991 to 2025, inclusive.
Fourth cycle, 2026 to 2060, inclusive.

TABLE 1.—*Areas and volumes for Custer working circle*

[The following area and volume table has been taken from the best available data. The figures for volume are for western yellow pine, the only merchantable species]

Block name	Forest-producing area					Volume, trees over 10 inches d. b. h.	
	Inaccessible	1–20 reproduction	20–80 pole stand	80 merchantable	Total forest-producing area	Accessible	Inaccessible
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*M. bd. ft.*	*M. bd. ft.*
Willow	1.4	1,939.5	1,275.5	9,090.8	12,305.8	38,745.8	6.5
French Creek	385.0	1,314.6	902.2	9,602.3	11,819.1	41,249.0	746.0
Bugtown		1,533.9	3,204.5	2,343.6	7,082.0	8,641.2	
Upper Hell Canyon		4,822.8	9,511.9	2,691.8	17,026.5	7,966.9	
Lower Hell Canyon *		2,360.0	3,534.4	21,257.8	27,152.2	56,949.8	
Pass Creek *		1,044.6	1,776.2	2,903.3	5,724.1	5,229.6	
Hawkwright *		345.4	680.4	1,758.0	2,783.8	3,622.0	
Pleasant Valley *		4,761.8	4,157.5	26,111.9	35,031.2	121,734.5	
Cold Brook		3,205.7	1,323.0	7,281.8	11,811.4	27,657.5	
Mayo	7.4	1,818.0	741.6	7,825.4	10,385.0	44,969.2	49.3
Haselrodt		771.4	372.0	6,095.2	7,238.6	40,432.4	
Flynn Creek		137.9	61.7	3,132.5	3,332.1	20,973.8	
Wind Wave		5,356.0	466.3	9,744.0	15,566.3	50,797.8	
Total	393.8	29,411.6	28,008.1	109,838.4	167,258.1	468,969.5	801.8

* Data not based on timber surveys. Figures only approximate.

[5] Johnson's figures indicate that the average annual increment per acre for the first 20 years after cutting is slightly over 168 feet b. m. In order to be conservative for the 35-year period, 150 feet per acre is adopted here.

TABLE 2.—*Stand, volume, and volume increment*

[Taken from F. R. Johnson's preliminary report of July 23, 1923, "Effect of thinnings—Black Hills yellow pine"]

Average acre, cut-over lands, western yellow pine, Black Hills region. Bases, 21 plots. Total acreage 5.33.

At time of cutting			10 years after cutting			20 years after cutting [1]		
D. b. h.	Trees	Volume	D. b. h.	Trees	Volume	D. b. h.	Trees	Volume
Inches	*Number*	*Board feet*	*Inches*	*Number*	*Board feet*	*Inches*	*Number*	*Board feet*
1	8.62							
2	12.94		2					
3	12.94		3	8.62				
4	17.81		4	12.94		4	8.62	
5	15.93		5	12.94		5	12.94	
6	17.06		6	17.44		6	12.94	
7	14.62		7	15.37		7	17.44	
8	12.75		8	16.50		8	15.37	
9	.75		9	14.06		9	16.50	
10	10.87	597.85	10	12.75	701.25	10	14.06	773.3
11	9.18	688.50	11	10.87	815.25	11	12.75	956.2
12	5.81	581.00	12	8.81	881.00	12	10.87	1,087.0
13	3.38	422.50	13	5.62	702.50	13	8.81	1,102.5
14	1.50	232.50	14	3.19	494.45	14	5.62	871.1
15	.56	106.40	15	1.50	285.00	15	3.19	606.1
16	.94	216.20	16	.56	128.80	16	1.50	345.0
17			17	.94	258.50	17	.56	154.0
18	.19	60.80	18			18	.94	300.8
			19	.19	71.25	19		
						20	.19	82.6
Total	145.85	2,905.75		142.3	[2] 4,338.00		142.30	[3] 6,278.6

[1] This represents the composition and volume of the stand at the time the study was made.
[2] 49.2 per cent volume increase.
[3] 116 per cent volume increase.

TABLE 3.—*Stand table*

[Derived from Table 2]

Average acre cut-over land, western yellow pine, Black Hills, S. Dak. Bases, 21 plots. Total plat acreage, 5.33.

D. b. h.	Known			Predicted			D. b. h.
	Time of cutting	10 years after cutting	20 years after cutting	30 years after cutting	35 years after cutting	40 years after cutting	
Inches	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*	*Inches*
1	8.62						
2	12.94						
3	12.94	8.62					
4	17.81	12.94	8.62				
5	15.93	12.94	12.94	8.62	4.31		5
6	17.06	17.44	12.94	12.94	10.78	8.62	6
7	14.62	15.37	17.44	12.94	12.94	12.94	7
8	12.75	16.50	15.37	17.44	15.19	12.94	8
9	.75	14.06	16.50	15.37	16.41	17.44	9
Subtotal	113.42	97.87	83.81	67.31	59.63	51.94	
10	10.87	12.75	14.06	16.50	15.94	15.37	10
11	9.18	10.87	12.75	14.06	15.28	16.50	11
12	5.81	8.81	10.87	12.75	13.40	14.06	12
13	3.38	5.62	8.81	10.87	11.81	12.75	13
14	1.50	3.19	5.62	8.81	9.84	10.87	14
15	.56	1.50	3.19	5.62	7.21	8.81	15
16	.94	.56	1.50	3.19	4.41	5.62	16
17		.94	.56	1.50	2.34	3.19	17
18	.19		.94	.56	1.03	1.50	18
19		.19		.94	.75	.56	19
20			.19		.47	.94	20
21				.19	.09		21
22					.10	.19	22
Subtotal	32.43	44.43	58.49	74.09	82.67	90.36	
Total	[1] 145.85	142.30	142.30	142.30	142.30	142.30	

[1] This figure is larger than the rest because trees which have since died or have been wind thrown are included.

TABLE 4.—*Stock table*

[Derived from Tables 2 and 3]

Average acre cut-over land, western yellow pine, Black Hills, S. Dak.

D. b. h.	Volume per acre					Volume per tree
	Known			Predicted [1]		
	Time of cutting	10 years after cutting	20 years after cutting	30 years after cutting	35 years after cutting	
Inches	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*
10	597.85	701.25	773.3	907.50	876.70	50
11	688.50	815.25	956.2	1,054.50	1,146.00	75
12	581.00	881.00	1,087.0	1,275.00	1,340.00	100
13	422.50	702.50	1,102.5	1,358.75	1,476.25	125
14	232.50	494.45	871.1	1,365.55	1,525.20	155
15	105.40	285.00	606.1	1,067.80	1,369.90	190
16	216.20	128.80	345.0	733.70	1,014.30	230
17	----------	258.50	154.0	412.50	643.50	275
18	60.80	----------	300.8	179.20	329.60	320
19	----------	71.25	----------	352.50	281.25	375
20	----------	----------	82.6	----------	204.45	435
21	----------	----------	----------	95.00	45.00	500
22	----------	----------	----------	----------	57.00	570
Total	2,905.75	4,338.00	6,278.6	8,802.00	10,309.15	----------
Volume increase, per cent	----------	49.2	116.07	202.9	254.78	----------

[1] On basis of number of trees per acre and average volume per tree.

TABLE 5.—*Volume increment per acre per annum for stand left after cutting* [1]

D. b. h.	After cutting		At time of cutting	
	Trees per acre	Volume increment	Trees per acre	Volume increment before cutting [2]
Inches	*Number*	*Cubic feet*	*Number*	*Cubic feet*
1	----------	----------	8.62	----------
2	----------	----------	12.94	----------
3	----------	----------	12.94	----------
4	8.62	0.1724	17.44	0.0872
5	12.94	0.3882	15.37	.2305
6	12.94	0.6470	16.50	.363
7	17.44	1.3080	14.06	.4499
8	15.37	1.6138	12.75	.6375
9	16.50	2.3925	----------	----------
10	14.06	2.9526	10.87	1.087
11	12.75	3.5700	8.81	1.2334
12	10.87	4.0219	5.62	1.0959
13	8.81	4.0526	3.19	.8294
14	5.62	3.0910	1.50	.5025
15	3.19	2.0735	.56	.238
16	1.50	1.1325	.94	.4860
17	.56	0.4816	----------	----------
18	.94	0.9118	.19	.1358
19	----------	----------	----------	----------
20	.19	0.228	----------	----------
Total	142.3	29.0374	142.3	7.3761

[1] From Johnson's preliminary report, "Black Hills yellow pine, effect of thinnings." P. 4a.

[2] The volume increment in this computation is based on the diameter of the trees as they existed at the time of cutting as derived from the table showing diameter accretion. In this case the 4, 5, and 6 inch diameter classes would be 1, 2, and 3 inches and show no volume since cubic increment was not secured for trees less than 4 inches d. b. h. In the last column, only increment on the trees left in cutting is considered.

MANAGEMENT PLAN FOR MEADOW VALLEY WORKING CIRCLE, PLUMAS NATIONAL FOREST, CALIF.

Respectfully submitted.

JOHN S. EVERITT,
Forest Assistant.

Approved October 10, 1922.

D. N. ROGERS,
Forest Supervisor.

Approved March 3, 1923.

PAUL G. REDINGTON,
District Forester.

Approved, subject to the acting forester's letter of this date, March 30, 1923.

E. E. CARTER,
Acting Forester.

SUMMARY

LOCATION

Northern Sierra region of California. Parts of Tps. 23, 24, and 25 N., Rs. 8 and 9 E., M. P. M.

AREA

	Acres
Government land	28,805.25
Private land	9,189.91
Total acreage	37,995.16

STAND

	Board feet
Government	797,627,000
Private	158,519,000
Total stand	956,146,000

Composition:	Per cent
Sugar pine	21.8
Western yellow pine	26.6
Douglas fir	28.4
White fir	17.0
Incense cedar	6.2

ROTATION

One hundred years; cutting cycle, 50 years.

PERCENTAGE OF STAND TO BE REMOVED DURING FIRST CUTTING CYCLE

	Per cent
Government	80
Private	95

LIMITATION OF CUT

Sixteen million board feet per year.

FIRST CUTTING BUDGET, 1923–1933

	Board feet
Government	92,000,000
Private	68,000,000
Total	160,000,000

PREDICTED SECOND CUT

Eight million to nine million board feet per year.

INTRODUCTION

The Meadow Valley working circle embraces an almost ideal area for the institution of forest management. (See map.) It is a distinct, clear-cut unit. It includes sufficient area and timber to support a moderate-sized operation. One owner, the United States, has title to over 80 per cent of the stumpage and can thus control the time, place, method, and amount of cutting.

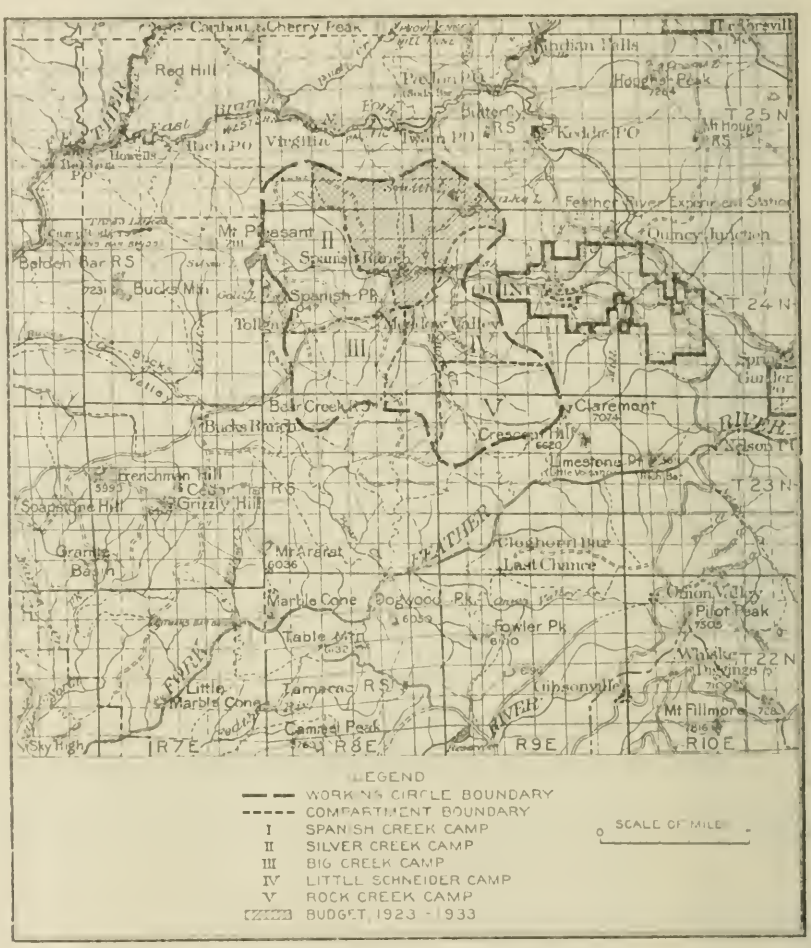

FIG. 2.—Meadow Valley Working plan, Plumas National Forest, Calif.

The purposes of this plan are:

1. To bring together all the available data concerning this unit which are necessary for the institution of forest management.

2. To determine the time, place, and amount of cutting which will best serve the interests of the United States and ultimately place the area on a sustained yield basis.

Calculations of yield and regulation of cut are of necessity crude, because of the lack of growth data on mixed stands, and particularly the lack of knowledge in regard to the effect of cutting on the remaining stand. Data used and results obtained are thought to be conservative and should serve their purpose until events and more data make a revision of the plan necessary.

DESCRIPTION OF WORKING CIRCLE

PHYSIOGRAPHIC FEATURES

Location.—This working circle, a subdivision of the Plumas National Forest, is about 8 miles west of Quincy, the county seat of Plumas County, Calif.

Acreage.—An area of 37,995.16 acres is embraced within the boundaries of this working circle. The Government controls 28,805.25 acres, and 9,189.91 acres are privately owned. On the 9,189.91 acres of private land 6,389.30 acres are controlled by the Spanish Peak Lumber Co.

Topography.—The area comprising this working circle lies in a natural basin formed by Spanish Creek and its various tributaries. Meadow Valley occupies the center of the area and is surrounded by high ridges and summits on all sides, except the east, where Spanish Creek leaves Meadow Valley and runs into American Valley. The area is considerably cut up by several streams with deep canyons.

The elevation ranges from 3,700 in the valley to about 5,200 feet on the high ridges. This rise in elevation takes place in a horizontal distance of less than 3 miles.

With the exception of the ridge tops and serpentine areas, the soil is generally of good depth and quality and contains a plentiful supply of moisture.

THE FOREST

The forest on this area is composed of a mixed stand of the following species:

	Per cent
Sugar pine	21.8
Western yellow pine	26.6
Douglas fir	28.4
White fir	17.0
Incense cedar	6.2

Types.—The major portion of the area is covered by a mixture of the species mentioned in the foregoing paragraph in various proportions. For the purpose of this plan it is unnecessary to make a fine distinction as to types, based on the proportion of different species present. Accordingly, only the following types or conditions have been recognized. Summarized for the Government and private lands they are, in acres:

	Timber	Cut over	Grazing and farm	Brush	Total
Government	25,787.25	1,305	30	1,683	28,805.25
Private	7,246.91	583	1,130	230	9,189.91
Total	33,033.16	1,888	1,160	1,913	37,995.16

The stand per acre on the timbered type and the total stand, Government and private, are:

	Stand per acre	Total stand
	Board feet	*Board feet*
Government	30,745	792,827,000
Private	22,535	163,319,000
Total		956,146,000

Site classes.—Lack of growth data makes the division of the area into detailed site classes of little use at the present time. Two site classes, conforming to the standards for site Classes II and III, have accordingly been recognized. There is a narrow fringe of true Class I around the valley. This, however, forms such a small percentage of the total acreage that for the purpose of this plan it has been combined with Site II. The range of tree heights

for the various site classes is: Site I, over 175 feet; Site II, 125 to 175 feet; Site III, under 125 feet.

The area has been divided into site classes, as follows:

	Site II acreage		Site III acreage	
	Cut over	Virgin	Cut over	Virgin
Government	1,305	22,427.25		3,360
Private	520	7,096.91	53	150
Total	1,825	29,524.16	53	3,510

Rate of growth.—In the virgin stand growth is practically at a standstill. The cruise shows that 2½ per cent of the timber is dead. The annual loss would, therefore, probably offset any increase in growth which the stand might make.

Growth data taken on cut-over areas show that in Site II, with a reserve stand averaging close to 5,000 board feet, the mean annual growth is about 200 board feet per acre.

On Site III, with a reserve stand of about 1,500 board feet, the rate of growth is about 30 board feet per acre per year.

ECONOMIC SITUATION

PRESENT AND FUTURE MARKETS

Disposal of the lumber from this area is dependent upon the general market. At the present time the upper grades of pine and Douglas fir go to the eastern market. The lower grades, particularly box lumber, are taken by the California market. Markets will probably be much the same in the future as at present, the East taking the better grades, and the steadily growing box industry of California the lower grades.

LABOR SUPPLY

Floating labor must be depended upon to furnish the greater part of the labor supply for this area. Because of climatic conditions winter work is impracticable; so there is no incentive for labor to become established. The present operation employs from 150 to 175 men. Less than 20 per cent of these are local residents.

POPULATION AND LOCAL NEEDS

The population adjacent to and within this working circle is very small Agriculture and dairying on a small scale are the principal occupations. The uncut and cut-over timbered land will furnish a plentiful supply of wood for fuel; so it is not necessary to lay off local-use areas.

TRANSPORTATION

An aerial tramway 5.1 miles in length connects this area with the Western Pacific Railroad at Grays Flat. Direct rail connections would have to be made by way of Quincy with the Quincy Railroad. This would necessitate the building of about 8 miles of railroad, partly on a canyon slope where construction would be expensive.

PRESENT MILLS

The present mills consist of one single band mill of 65,000 board feet daily capacity, located at Spanish Ranch, and one circular mill of about 30,000 board feet daily capacity, located on Slate Creek. Both mills are owned by the Spanish Peak Lumber Co., but only the band mill is operated at present.

SILVICULTURAL POLICY

OBJECTIVES

1. To produce saw timber suitable for the general market.
2. To remove the mature and decadent timber in as short a time as possible and at the same time to provide for a second cut of sufficient size to make a profitable operation.
3. To leave the area in the best condition for ultimately putting the forest on a sustained yield basis.

ROTATION

A rotation of 100 years has been accepted as the basis for management until such time as yield studies can be made to determine the proper rotation. A growth study made on cut-over lands indicates that the established reproduction will reach saw-timber size within this period.

CUTTING CYCLES

There will be two cutting cycles of 50 years each. For the first cutting cycle this will provide for an average cut, both Government and private, of about 23,000 board feet per acre. For the second cutting cycle the cut on Government land will be reduced to about 16,000 board feet per acre. The yield from private lands will be small during the second cutting cycle because of the fact that no provision can be made for a second cut.

MARKING

On Site II use the group selection and selection systems. The following rules are effective:

1. Leave all thrifty trees and the most promising of the thrifty-mature trees; that is, those which from appearances will continue to grow until the next cutting cycle.
2. Mark all mature and decadent trees.
3. Mark all dead, diseased, and green insect-infested trees.
4. Mark unusually tall trees and trees with very large crowns in situations exposed to severe winds.
5. Mark all trees which seriously interfere with the accepted logging plan.
6. The maximum opening should not exceed 2 acres.
7. Where possible, leave relatively large thrifty-mature sugar pine for quality increment.

On Site III leave only thrifty trees, except when these are insufficient for seeding purposes. The result will approach clear cutting with seed trees.

RESULTS OBTAINED ON PRESENT SALE

On the 1,305 acres of Government land cut over to date, the application of the above marking rules has resulted as follows:

	Per cent
Average cut per acre, 26,570 board feet	84.3
Average left per acre, 4,940 board feet	15.7

Future marking practice will follow the above rules, but in order to insure a satisfactory second cut will aim at leaving more of the thrifty mature trees. The result will be to cut about 80 per cent of the board-feet volume of the timber and to leave about 20 per cent. For the Government area the totals will be as follows:

	Per cent
Average cut per acre, 24,600 board feet	80
Average left per acre, 6,150 board feet	20

MANAGEMENT POLICY

OBJECTIVES

1. As is indicated in the policy statement for this area, this working circle is to be managed to supply a single manufacturing plant.
2. Alienated cut-over land available for exchange is to be acquired.

REGULATION OF THE CUT

With the data at hand, only a rough calculation of the annual cut can be made. For the first cutting cycle the annual cut is based on the following premises:

	Board feet
Total estimate for Government land	792, 827, 000
Amount to be cut during first cutting cycle, 80 per cent, or	634, 262, 000
Total estimate for private land	163, 319, 000
Amount to be cut during first cutting cycle, 95 per cent	155, 153, 000
Total amount to be cut	789, 415, 000

Cutting cycle	Total estimate	Amount to be cut	Annual cut
	Board-feet	*Board-feet*	*Board-feet*
50 years	956, 146, 000	789, 415, 000	15, 788, 000

An average annual cut of the rounded-off figure of 16,000,000 board feet has accordingly been adopted and is considered sound for the following reasons:

1. It is thought to be conservative, inasmuch as the estimates, particularly on private land, are considered low.

2. It provides for the removal of all the mature and decadent timber within 50 years, and at the same time provides for a second cut of sufficient size to make a profitable operation.

3. It places the area in shape for the starting of sustained yield.

GENERAL PROGRESS OF CUT

The general progress of cut contemplates (1) the completion of the present sale, (2) the cutting of the remaining timber on the north side of the valley, (3) the cutting of the timber on the south side of the valley. In other words, the cut will proceed counter clockwise around the basin.

LAND EXCHANGE

Of the 9,189 acres of patented land within the working circle, less than 4,000 acres will be available for land exchange. Over 60 per cent of the patented land was taken up through mineral and homestead entries and can not, therefore, be taken over by the Government under the present exchange law.[6] The land available for exchange should be acquired by the Government as soon as practicable after it is cut over.

CUTTING ON PRIVATE LANDS

Future production from this working circle will be strongly influenced by the condition in which the private land is left after the first cutting. This will be pointed out to those in control of lumbering on these private lands, and they will be urged to (1) fell all snags; (2) dispose of brush by piling, or at least by scattering the brush and protecting the area by fire lines; (3) preserve young growth in logging; (4) provide adequate fire protection while logging; and (5) leave at least four trees per acre 18 inches d. b. h. or over.

The carrying out of these measures will keep the land in productive condition and provide for at least one cut for the rotation period.

TIMBER-SALE POLICY

Under this plan the timber sale policy will include the following:

1. Provision for sales to supply the established industry with a continuous cut, so far as is possible under the procedure and policy existing at the time of sale.

[6] The exchange law was amended in 1925 to allow the reservation of mineral rights by either the proponent of an exchange or, if land instead of timber is the consideration, by the United States. The acreage desirable for acquisition by the Government in this circle has thus been increased, but the agricultural lands should remain in private ownership.

2. Limitation of the maximum annual cut on both Government and private timber to 16,000,000 board feet.
3. Completion of cutting on present sale area at a rate of 16,000,000 board feet per year.
4. Sale of remainder of timber on north side of area before any cutting starts on the south side.

NUMBER AND CAPACITY OF MILLS

One mill with a yearly capacity of 16,000,000 board feet will be required for this working circle. With an average logging season of about 150 days, this means a daily cut of about 110,000 board feet. As a matter of conservation, the established industry will not be urged to increase its capacity at once to the amount of the indicated annual yield, but should it decide to increase its annual cut no objection will be raised.

SIZE AND PERIOD OF SALES

Sales will be made by the topographic units and for as long as a 10-year period. In size, any sale may equal the 10-year cut, or 160,000,000 board feet, as soon as the local industry can take care of that amount.

ORDER OF CUTTING BY COMPARTMENTS

(See accompanying map of working circle, fig. 2.)
1. Spanish Creek compartment or present sale area.
2. Silver Creek compartment.
3. Big Creek compartment.
4. Little Schneider Creek compartment.
5. Rock Creek compartment.

The reasons for this order of cutting are:
1. Since to date only the most accessible timber has been logged from the present sale area, the remainder of this unit should be logged first.
2. It keeps the cut-over area in a compact unit.
3. It provides for the logging of the entire north side of the working circle before the south side is started, so that in case anything happens to the operating company the south side of the area will be left intact.
4. It takes the more mature timber early in the cutting cycle.
5. It leaves the Rock Creek compartment with its high percentage of fir till the last.

BRUSH DISPOSAL

Tops will be lopped and brush piled and burned, as is now done. Up to the present time this has resulted in a satisfactory cleaning up of the area from a fire standpoint and has caused very little damage to the reserve stand.

UTILIZATION REQUIREMENTS

The present standard utilization requirements are applicable to this working circle, and for the first periodic sale at least no additional or special requirements are necessary.

FIRE-PROTECTION REQUIREMENTS

In order to insure sustained yield and the successful carrying out of this plan adequate fire protection is essential. This area, however, presents no serious fire hazard and the standard timber sale fire-protection requirements will be sufficient.

INSECT CONTROL

There are several small areas on the south side of the working circle that show recent insect infestation (*Dendroctonus brevicomis*). These areas should be watched, and if these infestations tend to become epidemic control measures should be promptly instituted.

LOGGING METHODS

Because of topographic conditions, this working circle is essentially a donkey-logging proposition. Transportation by railroad was originally planned for the

entire area, but up to the present time chutes and gas trucks have been used. It would seem that a railroad is desirable, particularly in logging the more inaccessible portions of the area. Until more data are accumulated on the size of operation requiring a railroad and as long as the operating company can show a profit by using trucks the Government is not in a position to dictate the method of transportation.

Cutting budget for 1923–1933

[Present sale extends to 1931]

Compartment	Amount to be cut		Total
	Government	Private	
	Board-feet	*Board-feet*	*Board-feet*
Spanish Creek	92,000,000	68,000,000	160,000,000

REVISION OF PLAN

A working plan must be revised at frequent intervals if it is to be workable and not become obsolete. Revision is essential when the original plan is based on rough data.

This plan should be revised at the termination of the first 10-year cutting period, if revision is not required before that time.

DATA NECCESSARY FOR REVISION OF PLAN

1. Division of the area into site classes, based on height of trees.
2. One hundred per cent estimate of trees over 4 inches d. b. h. left after cutting, and at least 1 per cent estimate of trees under 4 inches d. b. h.
3. Correction of estimate for both Government and private timber by checking stands cut and left against original estimate.
4. Yield study by sites on cut-over land to determine the rate of growth after release by cutting.

APPENDIX, MEADOW VALLEY WORKING CIRCLE

HISTORY OF WORKING CIRCLE

Timber exploitation within this circle started in 1913, at which time the Towle Lumber Co. constructed a mill of about 30,000 daily capacity on Slate Creek. This mill was operated by the company from 1913 to the middle of the season in 1915. During this time about 10,000,000 board feet of timber was cut.

In 1916 the Spanish Peak Lumber Co. was organized, with holdings of over 100,000,000 board feet within this unit. A mill of about 65,000 daily capacity was erected at Spanish Ranch. An aerial tramway was constructed to convey the lumber from the mill to the lumberyard at Grays Flat, which is on the main line of the Western Pacific Railroad.

In 1916 the Government made the present sale of 106,000,000 board feet to this company. Cutting of both Government and private timber has been continuous since that time.

In 1920 the company purchased the Towle Lumber Company's mill and private holdings, operating it in conjunction with their own mill during the entire season.

The cut by years for both Government and private timber from this unit is as follows:

Year	Government	Private	Year	Government	Private
	Board feet	*Board feet*		*Board feet*	*Board feet*
1913–1915		10,000,000	1920	4,041,000	6,995,000
1916	4,376,000	2,007,000	1921	5,190,000	2,552,000
1917	9,587,000	1,651,000			
1918	7,563,000	638,000	Total	34,570,000	28,028,000
1919	3,813,000	4,185,000			

DISCUSSION OF CRUISE

The Government land on this area was cruised in 1910. The trees were tallied by 2-inch diameter classes, the number of logs per tree not being tallied. Volumes were computed from especially prepared volume tables. Trees from 12 to 20 inches d. b. h. were not tallied.

Checking the estimate for 1,300 acres of cut-over land against the cut and the amount left for the same area gives the following result:

	Board feet
Cut	34,541,000
Left	6,425,900
Total	40,966,900
Estimate	35,928,100
Difference	5,038,800
Underestimate—per cent	12.3

A comparison of the Forest Service cruise on 4,160 acres on the south side of the area with the cruise made by the University of California Forest School on the same area results as follows:

	Board feet
University of California Forest School estimate	151,767,000
Forest Service estimate	130,720,000
Difference[a]	21,047,000

A part of the underestimate of the Forest Service cruise was probably due to the fact that trees from 12 to 20 inches d. b. h. were not included.

FIRE HAZARD

This unit would be classed as an area of low fire hazard for the following reasons:

1. A heavy snowfall, with cool nights during most of the year, prevents a rapid drying out of the area.
2. The entire area is directly under the eye of the Spanish Peak lookout, so fires should be detected when small.
3. All parts of the area are readily accessible by roads and trails.
4. There is a good supply of labor close at hand.
5. The area is comparatively free from the two chief causes of fires—lightning and campers.

Summary of fire record for last 11 years

Year	Number of fires	Acreage burned	Year	Number of fires	Acreage burned
1911	2	0.5	1919	3	2
1912	4	12	1920	2	340
1913	8	16	1921	1	0
1914	8	160			
1915	1	0	Total	31	531
1916	0	0			
1917	1	.5	Average per year		48
1918	1	0			

On the basis of the fire record for the last 11 years the loss from fire during the first cutting cycle would not be heavy. A total of 2,400 acres would be burned over, but only part of this would fall on virgin timberland, and the loss on this should not be high. The main loss would come through the destruction of poles and advance reproduction. With the steady improvement in the fire-protection system, normal loss from fire should not seriously interfere with the plan for the institution of sustained yield.

GROWTH AND YIELD

Growth and yield data for mixed stands are very meager. The problem of predicting yield for the second cutting cycle and for the rotation period is

[a] 16.1 per cent of Forest Service estimate.

further complicated by lack of knowledge of the effect of the two cuttings on the stand.

In order to get some idea of what the yield from cut-over land might be in 50 years, 500 increment borings were taken on a mixed stand cut about 45 years ago. The results of this study were then applied to the reserve stand left on this working circle.

Table 2 shows the increase in diameter by 2-inch diameter classes for a 50-year period.

Application of these results to the stand and stock tables for the Government land cut over to date gives the following:

Volume per acre in board feet

Cutting cycle	Average original stand	Amount cut (84.7 per cent)	Amount left (15.3 per cent)	Increment on 12-inch d. b. h. trees left	Volume of pole stuff merchantable	Average stand at second cut
50 years	30,700	26,000	4,700	10,000	2,800	17,500

Under the provisions of this plan it is proposed to leave 20 per cent of the stand and remove 80 per cent. Under these conditions the resultant stand at the end of 50 years would be as follows:

Volume per acre in board-feet at the end of 50 years

Cutting cycle	Average original stand	Amount cut (80 per cent)	Amount left (20 per cent)	Increment on 12-inch d. b. h. trees left	Volume of pole stuff merchantable	Average stand at second cut
50 years	30,700	24,600	6,100	12,000	2,800	20,900

The above computations indicate that with a reserve stand of 6,100 per acre a stand of 20,000 or over would be produced in 50 years. This is not considered too much to expect, inasmuch as 90 per cent of the trees left are under 30 inches d. b. h., and with release from competition and suppression should take on increment rapidly. A cut of 16,000 per acre is therefore considered conservative for the second cutting cycle.

DISCUSSION OF ROTATION AND CUTTING CYCLES

Available growth data indicate that on a 100-year rotation a tree of at least 18 inches d. b. h. can be produced. The reproduction under 4 inches d. b. h. now on the ground should, in a 100-year period, be from 24 to 30 inches d. b. h. Figuring that logging during the second cutting cycle will destroy about one-half of the reproduction, there should be at the end of the first rotation a stand one-half stocked with trees from 18 to 30 inches d. b. h., with a small percentage of larger trees left for seeding purposes when the second cut is made. It would therefore seem safe to assume a rotation period of 100 years to start with.

In determining the length of cutting cycles to be adopted the following conditions were considered:

1. A rapid cutting over of the area, removing from 60 to 65 per cent of the volume. First cutting cycle, 35 to 40 years. Second, 60 to 65 years.

2. A slower cutting over of the area, removing from 80 to 85 per cent of the volume. Cutting cycles, 50 years each.

Advantages of rapid cutting.—Removes decadent and part of mature timber in from 35 to 40 years. Leaves heavier second cut more nearly approaching a sustained-yield basis.

Disadvantages of rapid cutting.—(*a*) From 15 to 20 per cent of timber left would be of mature and thrifty-mature classes. (*b*) Marking would be complicated. (*c*) A lighter cut per acre reduces the chance for a profitable operation at present.

Advantages of slow cutting.—(*a*) Removes all of the mature timber and most of the thrifty mature. (*b*) Provides for a greater growth on remaining stand because of more complete release. (*c*) Simplifies marking. (*d*) Insures a profitable operation at present.

Disadvantages of slow cutting.—(*a*) Makes a reduction in the second cut of from 40 to 45 per cent.

REGULATION OF THE CUT

Because of the maturity of the stand annual growth will not greatly exceed annual loss from old age, insects, windfall, etc. Determination of the annual cut by methods involving a detailed knowledge of increment was, therefore, not considered necessary.

In arriving at the annual cut the total amount to be cut, 787,646,000 board feet, was divided by the length of the cutting cycle, 50 years, giving an annual cut of 16,000,000 board feet.

FORECAST OF SECOND CUT

Basis:

22,732 acres, site class II.
20,000 board feet predicted stand per acre at end of 50 years.
474,640,000 board feet. Total stand at end of 50 years.
379,712,000 board feet stand to be removed during second cutting cycle.
379,712,000 divided by 50 equals 7,594,000 board feet or annual cut.

A cut of 7,500,000 feet from Site II, plus whatever excess may accumulate during the first cutting cycle, together with a small cut from Site III, should give a total second cut of from 8,000,000 to 9,000,000 feet per year.

In 50 years, with closer utilization and with the increase in the value of lumber, this should make a profitable operation.

TABLE 1.—*Stand by sections for Government and private land*

Township	Section	Government	Private	Township	Section	Government	Private
		M bd. ft.	*M bd. ft.*			*M bd. ft.*	*M bd. ft.*
23-8	1	9,118		25-8	32	8,386	
	2	2,021			33	5,485	
	3	6,917			34	10,530	
	4	10,360			35	7,183	11,320
	5	8,220			36		12,960
24-8	1	4,492	1,650	23-9	6	30,190	
	2	2,808	2,100		5	35,884	
	3	3,901	335		7	20,720	
	4	10,849			8	13,509	
	5	16,219			17	5,392	
	6	3,635			9	9,007	
	7	6,291			4	7,383	
	8	20,051			10	1,886	
	9	13,053	1,990		3	1,905	
	10	5,615	5,718		16		1,225
	11	2,762	435	24-9	6	16,085	1,585
	12	926	2,200		5	6,137	10,526
	13	8,202	7,560		4	1,153	
	14	1,219	5,291		7	10,002	2,031
	15		6,500		8	5,649	720
	16	12,353	850		18	1,302	4,250
	17	17,847			17	3,077	
	20	18,551			19	4,800	
	21	13,413	4,486		20	23,933	
	22	2,092	12,100		30	8,647	3,571
	23	2,558	9,400		21	4,276	
	24	5,221	4,700		29	21,926	
	25	18,401	13,460		28	14,804	240
	26	21,778	11,426		27	1,975	
	27	25,213	1,200		31	29,807	
	28	15,396	4,600		32	23,711	
	29	7,406	4,400		33	13,606	1,220
	32	7,302	2,820		34	7,146	
	33	15,841	1,120		27	1,975	
	34	13,936		25-9	30	5,927	
	35	25,618			31	15,516	455
	36	32,072			32	10,740	311
25-8	29	1,372					
	31	14,181	1,600			797,627	188,519

TABLE 2.—*Diameter growth for 50-year period after cutting*

[Based on 500 increment borings taken on stand cut over 45 years ago]

Present d. b. h. (inches)	D. b. h. in 50 years					Present d. b. h. (inches)	D. b. h. in 50 years				
	Sugar pine	Western yellow pine	Douglas fir	White fir	Incense cedar		Sugar pine	Western yellow pine	Douglas fir	White fir	Incense cedar
	Inches	*Inches*	*Inches*	*Inches*	*Inches*		*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
4	16	14	14	16	12	30	42	38	38	40	38
6	18	18	16	18	14	32	44	40	40	40	40
8	22	20	18	20	16	34	46	42	42	42	42
10	24	22	20	22	20	36	46	42	44	44	44
12	26	24	22	24	22	38	48	44	44	46	46
14	28	26	26	26	24	40	48	46	46	48	48
16	30	26	28	28	26	42	50	46	48	48	48
18	32	28	30	28	26	44	50	------	50	------	------
20	34	30	32	30	28	46	52	------	------	------	------
22	34	32	32	32	30	48	54	------	------	------	------
24	36	34	34	34	32	50	------	------	------	------	------
26	38	36	36	36	34	52	------	------	------	------	------
28	40	36	38	38	36	54	------	------	------	------	------

TABLE 3.—*Stand on average acre—cut-over land*

[Basis, 120-acre strip]

D. b. h. (inches)	Sugar pine	Western yellow pine	Douglas fir	White fir	Incense cedar	Total
	Number of trees	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*
4	0.44	0.63	0.73	1.25	0.30	3.35
6	.34	.47	.99	1.19	.39	3.38
8	.16	.30	.71	.83	.14	2.14
10	.30	.27	.63	.83	.34	2.37
Subtotal	1.24	1.67	3.06	4.10	1.17	11.24
12	.33	.24	.34	.46	.36	1.73
14	.20	.40	.44	.52	.55	2.11
16	.19	.38	.32	.30	.28	1.47
18	.18	.21	.28	.16	.20	1.03
20	.11	.17	.26	.22	.33	1.09
22	.17	.22	.25	.36	.20	1.20
24	.19	.14	.23	.24	.14	.94
26	.16	.12	.18	.20	.07	.73
28	.07	.09	.10	.11	.04	.41
30	.12	.06	.09	.07	.10	.44
32	.10	.03	.08	.08	.07	.34
34	.06	.02	.03	.01	.01	.13
36	.01	------	.01	.01	.01	.04
38	.03	------	.01	------	.02	.06
40	.03	------	------	------	.01	.04
42	.03	------	------	.02	------	.05
44	------	------	------	------	------	.00
46	------	------	.01	------	.01	.02
48	.01	------	------	------	------	.01
Subtotal	1.99	2.08	2.63	2.74	2.40	11.84
Total	3.23	3.75	5.69	6.84	3.57	23.08

TABLE 4.—*Growing stock on average acre, cut-over land*

[Basis, 120-acre strip]

D. b. h. (inches)	Sugar pine	Western yellow pine	Douglas fir	White fir	Incense cedar	Total
	Board-feet	*Board-feet*	*Board-feet*	*Board-feet*	*Board-feet*	*Board-feet*
12	26.4	32.4	31.6	36.8	17.3	144.5
14	19.0	72.0	63.8	67.6	29.7	252.1
16	27.5	87.4	63.6	55.5	20.7	254.7
18	41.4	65.1	75.6	41.4	24.0	247.5
20	38.5	73.1	92.5	74.2	56.1	334.4
22	81.6	128.4	119.5	160.2	45.6	535.3
24	121.6	108.2	136.6	140.1	40.6	547.1
26	131.2	118.8	133.2	150.0	26.2	559.4
28	69.6	110.3	92.5	105.6	19.6	397.0
30	145.8	89.6	101.2	82.0	59.1	477.7
32	158.1	52.8	105.4	86.8	51.3	454.4
34	102.5	41.5	45.9	17.4	8.7	216.0
36	19.8		18.1	20.5	10.1	68.5
38	68.2		21.3		23.4	112.9
40	78.7				13.4	92.1
42	90.1			61.3		151.4
44						
46			34.5		19.2	53.7
48	44.9					44.9
50						
Total	1,264.9	979.6	1,135.3	1,099.4	464.4	4,943.6

TABLE 5.—*Predicted stand*

[Number of trees on average acre at end of 50 years]

D. b. h. (inches)	Sugar pine	Western yellow pine	Douglas fir	White fir	Incense cedar	Total
	Number of trees	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*	*Number of trees*
12					0.30	0.30
14			0.73		.39	1.12
16	0.41	0.63	.99	1.25	.14	3.45
18	.34	.47	.71	1.18	.34	3.04
20		.30	.63	.83		1.76
22	.16	.27	.34	.83	.36	2.26
24	.30	.24		.46	.57	1.60
26	.33	.40	.51	.53	.50	1.94
28	.21	.60	.34	.30	.34	1.79
30	.19	.17	.29	.39	.20	1.24
32	.19	.23	.26	.36	.14	1.18
34	.28	.14	.55	.24	.11	1.32
36	.19	.22	.20	.21	.11	.93
38	.16	.06	.21	.11	.07	.61
40	.07	.03	.10	.03	.01	.24
42	.14	.03	.03	.01	.01	.22
44	.10		.02	.01	.03	.16
46	.07				.01	.08
48	.06			.03		.09
50	.03				.01	.04
52						
54	.01					.01
Total	3.27	3.79	5.01	6.77	3.64	23.38

TABLE 6.—*Predicted growing stock*

[Board feet on average acre at end of 50 years]

D. b. h. (inches)	Sugar pine	Western yellow pine	Douglas fir	White fir	Incense cedar	Total
	Board feet	*Board feet*	*Board feet*	*Board feet*	*Board feet*	*Board feet*
12	----------	----------	----------	----------	13.5	13.5
14	----------	----------	105.8	----------	23.4	129.2
16	68.2	144.9	188.1	231.2	11.2	643.6
18	73.1	145.7	173.9	295.0	40.8	728.5
20	----------	124.5	201.6	273.9	----------	600.0
22	67.2	151.2	142.8	356.9	81.0	799.1
24	165.0	192.0	----------	257.6	165.3	779.9
26	222.2	396.0	326.4	376.3	175.0	1,495.9
28	182.7	750.0	282.0	268.5	153.0	1,636.2
30	207.1	260.0	308.8	429.0	114.0	1,318.9
32	258.4	404.8	335.4	495.0	93.8	1,587.4
34	461.8	303.8	797.5	403.2	95.7	2,065.0
36	361.2	513.4	326.0	444.1	107.8	1,785.5
38	360.0	167.4	409.5	261.8	73.8	1,272.5
40	181.8	97.8	234.0	343.2	12.5	872.3
42	420.0	111.8	85.5	31.8	13.9	663.0
44	350.0	----------	63.0	34.9	51.0	498.9
46	269.3	----------	----------	----------	18.6	287.9
48	270.0	----------	----------	136.5	23.9	430.4
50	159.0	----------	----------	----------	----------	159.0
52	----------	----------	----------	----------	----------	----------
54	67.9	----------	----------	----------	----------	67.9
Total	4,153.9	3,793.3	3,980.3	4,638.9	1,268.2	17,834.6

MANAGEMENT PLAN FOR THE WOODLAND WORKING CIRCLE, PIKE NATIONAL FOREST, COLO.

SUMMARY

LOCATION

From 12 to 35 miles northwesterly from Colorado Springs.

AREAS

	Acres
Gross area within national forest boundaries	117,573
Total national forest land	93,520
National forest land now timbered	82,910
Patented land	24,053

TIMBER, NATIONAL FOREST LAND ONLY

Saw timber	board feet	63,551,000
Railroad ties	pieces	799,000
Mine props	linear feet	50,752,000

SPECIES COMPOSING PRESENT VOLUME

	Per cent
Western yellow pine	50
Douglas fir	40
Engelmann spruce, limber pine, lodgepole pine, etc	10

CROP TO BE GROWN

Saw timber chiefly, with hewn ties, mine timbers and props, and other minor products cut from small mature trees, tops, thinnings, etc.

SILVICULTURAL SYSTEM

Selection.

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WORKERS IN SUBJECTS PERTAINING TO AGRICULTURE IN STATE AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

1927–1928

OFFICE OF EXPERIMENT STATIONS

MISCELLANEOUS PUBLICATION No. 12

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MISCELLANEOUS PUBLICATION No. 12
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WORKERS IN SUBJECTS PERTAINING TO AGRICULTURE IN STATE AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS

By MARY A. AGNEW
Office of Experiment Stations

1927–1928

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON
1928

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KEY TO ABBREVIATIONS

Acct., Accountant, Accounts.
Actg., Acting.
Admin., Administration, Administrative.
Agr., Agriculture, Agriculturist, Agricultural.
Agron., Agronomy, Agronomist.
Agt., Agent.
An., Animal.
Anal., Analytical, Analysis.
Anat., Anatomy.
Arch., Architecture.
Assoc., Associate, Association.
Asst., Assistant.
Bact., Bacteriology, Bacteriologist.
Biochem., Biochemist, Biochemistry.
Biol., Biology, Biologist, Biological.
Bot., Botany, Botanist, Botanical.
Brdg., Breeding.
Chair., Chairman.
Chem., Chemistry, Chemist, Chemical.
Climat., Climatology, Climatologist.
Coll., College.
Comp., Comparative.
Comn., Commission.
Comr., Commissioner.
Consult., Consulting.
Coop., Cooperation, Cooperative, Cooperator.
Corresp., Correspondence, Correspondent.
Dem., Demonstration, Demonstrator.
Dept., Department.
Dir., Director.
Dist., District.
Div., Division.
Dom., Domestic.
Econ., Economy, Economic, Economics, Economist.
Ed., Education.
Engin., Engineer, Engineering.
Ent., Entomology, Entomologist, Entomological.
Erad, Eradication.
Expt., Experiment, Experimentalist, Experimental.
Ext., Extension.
Fert., Fertility, Fertilizer.
Flor., Floriculture, Floriculturist, Floricultural.
For., Forestry, Forester.
Gard., Gardening.
Gen., General.
Geol., Geology, Geologist, Geological.
Grad., Graduate.
Histol., Histology, Histologist.
Hon., Honorary.
Hort., Horticulture, Horticulturist, Horticultural.
Husb., Husbandry, Husbandman.
Hyg., Hygiene.
Illus., Illustration, Illustrative.
Indus., Industry, Industrial, Industries.
Inorg., Inorganic.
Insp., Inspection, Inspector.
Instr., Instructor, Instruction.
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Invest., Investigations, Investigational, Investigator.
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Lab., Laboratory.
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Libr., Library, Librarian.
Mach., Machine, Machinery.
Mech., Mechanics, Mechanical.
Met., Meteorology, Meteorologist.
Mfg., Manufacturing.
Mfrs., Manufactures.
Mgr., Manager.
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Mktg., Marketing.
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Photog., Photography, Photographer.
Phys., Physics, Physical.
Physiol., Physiology, Physiologist, Physiological.
Pomol., Pomology, Pomologist, Pomological.
Pract., Practice, Practical.
Prep., Preparatory.
Pres., President.
Prin., Principal.
Prod., Production.
Prof., Professor.
Pubs., Publications.
Sci., Science, Scientific.
Sect., Section.
Secy., Secretary.
Secon., Secondary.
Sociol., Sociology, Sociologist.
Sta., Station.
Substa., Substation.
Supt., Superintendent.
Supvr., Supervisor.
Surg., Surgery.
Tech., Technology, Technologist, Technical.
Treas., Treasurer.
Trop., Tropical.
Univ., University.
Veg., Vegetable, Vegetation.
Vet., Veterinary, Veterinarian.
Vit., Viticulture, Viticulturist, Viticultural.
Voc., Vocational.
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NOTE.—In the preparation of this publication Miss Agnew was assisted by Miss Betty T. Richardson, of the Office of Experiment Stations.

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A key to the abbreviations used is given on page III.

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Entomology—*See* **Biology.**

Extension (Admin.):[1]
Director Ross *in charge.*
‡A. B. Ballantyne, B. S., *Asst. Dir.*
‡Frances L. Brown, B. S., *State Home Dem. Leader.*

Home Economics:
•Stella Mather, M. A., *Prof. Home Econ.*
•Olive Gallatin, M. S., *Instr. Home Econ.*
•Maude E. Jenkins, M. S., *Assoc. Prof. Home Econ.*
•Edith S. Ranney, M. A., *Assoc. Prof. Home Econ.*
•†Mrs. Margaret C. Smith, Ph. D., *Assoc. Prof. and Research Specialist in Home Econ.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

Horticulture:
- *†A. F. Kinnison, M. S., *Prof. Hort.; Hort.*
- *†D. W. Albert, M. S., *Assoc. Prof. and Assoc. Hort.*
- †A. G. Carns, B. S., *Field Asst. in Irrig. and Hort.*
- *†M. F. Wharton, M. S., *Asst. Prof. and Asst. Hort.*

Miscellaneous:
- *Estelle Lutrell, A. M., *Libr.*
- *Mrs. Ethel N. Ikenberry, B. S., *Editor.*

Substations:
- Prescott Dry-Farm, *P. O., Prescott*—C. W. Clark, B. S., *Foreman.*
- Salt River Valley Farm, *P. O., Mesa*—Charles Hobart, M. S., *Research Asst.*
  C. J. Wood, *Foreman.*
- Tempe Date-Palm Orchard, *P. O., Tempe*—T. L. Stapley, *Foreman.*
- University Farm, *P. O., Tucson*—J. R. Reed, *Foreman.*
- Yuma Valley and Mesa Farms, *P. O., Yuma*—J. G. Hamilton, B. S., *Foreman.*

ARKANSAS

College of Agriculture and the Agricultural Experiment Station of the University of Arkansas, *Fayetteville*

*College faculty. †Station staff. ‡Extension staff

*J. C. Futrall, M. A., LL. D., *President of University*
*†‡Dan T. Gray, A. B., M. S., *Dean Coll. of Agr., Dir. of Sta., Dir. Agr. Ext. Service*

Agronomy:
- *†Martin Nelson, M. S., *Head of Dept.*
- *†R. P. Bartholomew, Ph. D., *Asst. Prof. and Asst. Agron.*
- ‡D. J. Burleson, M. S., *Agron. Specialist.*
- *†George Janssen, Ph. D., *Asst. Prof. and Asst. Agron.*
- *†C. K. McClelland, M. S., *Asst. Prof. and Asst. Agron.*
- *†W. H. Metzger, M. S., *Instr. and Asst. Agron.*
- *†J. O. Ware, M. S., *Assoc. Prof. and Assoc. Agron.*

Animal Industry:
- *†H. E. Dvorachek, B. S., *Head of Dept.*
- *†C. J. Byrd, B. S., *Instr. and Asst. An. Husb.*
- *†M. S. Libbert, B. S., *Instr. An. Husb. (Dairying); Dairy Bact. and Chem.*
- *†Edgar Martin, M. S., *Asst. Prof. and Asst. An. Husb. (Beef Cattle and Horses).*
- ‡M. W. Muldrow, B. S., *Livestock Specialist (P. O., Little Rock).*
- *†R. M. Smith, M. A., *Asst. Prof. and Asst. An. Husb. (Poultry).*
- ‡S. R. Wallis, B. S., *Poultry Specialist.*
- *†C. C. Watts, M. S., *Instr. and Asst. An. Husb. (Dairying).*
- ‡W. H. Woodley, B. A., *Dairying Specialist.*

Bacteriology:
- *†W. L. Bleecker, D. V. M., *Head of Dept.*

Chemistry (Agr.):
- *†Burnett Sure, Ph. D., *Head of Dept.*
- *†M. C. Kik, Ph. D., *Asst. Prof. and Invest. in Agr. Chem.*
- †Dorothy Walker, B. A., *Asst. in Agr. Chem. Research.*

Economics and Sociology (Rural):
- *†C. O. Brannen, A. M., *Head of Dept.*
- *†Carlos Campbell, M. S., *Asst. Prof. Rural Econ. and Sociol.*
- *†J. A. Dickey, M. A., *Prof. Rural Econ. and Sociol.*
- *†B. M. Gile, Ph.D., *Assoc. Prof. Rural Econ. and Sociol.*
- ‡J. S. Knox, M. S., *Mktg. Specialist.*
- *‡A. D. McNair, *Prof. and Specialist in Farm Mgt. (Coop. U. S. D. A.).*

Editorial:
- ‡K. B. Roy, B. J., *Ext. Editor.*
- *‡J. P. Bell, *Asst. Editor.*

Education (Agr.):
- *K. L. Holloway, M. S., *Assoc. Prof. Agr. Ed.*

Engineering (Agr.):
- *†D. G. Carter, M. S., *Head of Dept.*
- *†H. T. Barr, B. S. A. E., *Instr. and Asst. Agr. Engin.*

Entomology:
- *†W. J. Baerg, Ph. D., *Head of Dept.*
- *†D. G. Hall, B. S., *Instr. and Asst. Ent.*
- *†Dwight Isely, M. A., *Assoc. Prof. and Assoc. Ent.*

Extension (Admin.):[1]
- Director Gray *in charge.*
- ‡T. R. Reid, M. S., *Asst. Dir. (P. O., Little Rock).*
- ‡Connie J. Houslagel, A. B., *State Home Dem. Agt. (P. O., Little Rock).*
- ‡W. J. Jernigan, B. A., *State Boys' and Girls' Club Leader (P. O., Little Rock).*

Forestry:
- ‡W. K. Williams, jr., B. S., M. F., *For. Specialist.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

Home Economics:

•†Mrs. Henrietta K. Burton, M. A., *Head of Dept.*
‡Gertrude E. Conant, B. A., *Foods and Nutr. Specialist (P. O., Little Rock).*
‡Bess P. Hodges, M. S., *Clothing and Textiles Specialist (P. O., Little Rock).*
†Madge E. Johnson, M. A., *Home Econ. Research.*
‡Ruby Mendenhall, B. S., *Food Preservation Specialist (P. O., Little Rock).*
•M. Agnes Nelson, M. A., *Instr. Home Econ.*
•Marion L. Normington, M. S., *Instr. Home Econ.*
•Margaret E. Smith, M. S., *Asst. Prof. Home Econ.*

Horticulture:

•†J. R. Cooper, M. S., *Head of Dept.*
•†V. M. Watts, M. S., *Asst. Prof. and Asst. Hort.*

Horticulture—Continued.

‡Claude Woolsey, M. S., *Hort. Specialist.*

Plant Pathology:

•†V. H. Young, Ph. D., *Head of Dept.*
•†H. R. Rosen, Ph. D., *Assoc. Prof. and Assoc. Plant Path.*

Veterinary Science:

•†J. H. Bux, D. V. S., *Head of Dept. (State Vet.: P. O., Little Rock).*
•†S. J. Schilling, M. S., D. V. M., *Assoc. Prof. and Asst. Vet.*

Miscellaneous:

•†Margaret Galloway, *Libr.*

Substations:

Cotton Expt. Sta., *P. O., Marianna*—E. B. Whitaker, B. S., *in charge.*
Rice Expt. Sta., *P. O., Stuttgart*—G. H. Banks, B. S., *in charge.*
Fruit and Truck Expt. Sta., *P. O., Hope*—G. W. Ware, B. S., *in charge.*

State Agricultural, Mechanical, and Normal School, *Pine Bluff*

•Agricultural faculty

•R. E. Malone, A. M., *Superintendent*
•W. L. Webb, *Dir. Agr. Dept.*

•A. L. Evans, *Head Sci. Dept.*
•H. Rebecca Fisher, *Asst. in Household Econ.*
•Ethel L. Lovett, *Asst. in Household Econ.*
•Eulah L. McGehee, *Dir. Household Econ. Dept.*
•C. S. Woodard, B. S., *Dir. Smith-Hughes Agr.*

CALIFORNIA

College of Agriculture, the Agricultural Experiment Station, and the Department of Home Economics of the University of California, *Berkeley*

•College faculty. †Station staff. ‡Extension staff

•W. W. Campbell, Sc. D., LL. D., *President of University*
•†E. D. Merrill, Sc. D., *Dean Coll. of Agr., Dir. of Sta.*
‡B. H. Crocheron, M. S., *Dir. Agr. Ext. Service*
†H. J. Webber, Ph. D., D. Agr., *Dir. Citrus Expt. Sta.*
•†W. L. Howard, Ph. D., *Dir. Branch of Coll. of Agr., Assoc. Dean Coll. of Agr.*

Agronomy:

•†B. A. Madson, B. S., *Head of Div. (P. O., Davis).*
•†J. W. Gilmore, M. S., *Prof. Agron. (P. O., Davis).*
•†D. R. Hoagland, M. S., *Head Div. of Plant Nutr.; Chem.*
•†C. F. Shaw, B. S., *Head Div. of Soil Tech.*
†Ruth F. Allen, Ph. D., *Assoc. in Agron. (Coop. U. S. D. A.).*
•V. T. Allen, M. S., *Instr. Geol. (P. O., Davis).*
†W. Bedford, *Field Asst. in Agron.*
•†G. B. Bodman, Ph. D., *Instr. and Asst. in Soil Tech.*
†F. N. Briggs, Ph. D., *Assoc. in Agron. (Coop. U. S. D. A.).*
•J. S. Burd, B. S., *Prof. Plant Nutr.*

Agronomy—Continued.

†J. P. Conrad, B. S., *Asst. in Agron. (P. O., Davis).*
†S. W. Cosby, M. S., *Research Asst. in Soil Tech.*
•A. R. Davis, Ph. D., *Assoc. Prof. Plant Physiol.*
†J. A. Denny, *Foreman in Cereal Work.*
†W. H. Dore, B. S., *Assoc. Chem.*
†W. F. Gericke, Ph. D., *Assoc. Plant Physiol.*
†A. R. C. Haas, Ph. D., *Assoc. Plant Physiol. (P. O., Riverside).*
†F. F. Halma, Ph. D., *Asst. Plant Physiol. (P. O., Riverside).*
•†G. W. Hendry, B. S., *Asst. Prof. and Assoc. Agron.*
†P. L. Hibbard, B. S., *Assoc. Chem.*

Agronomy—Continued.

*†P. B. Kennedy, Ph. D., *Prof. Agron.; Agrostologist.*
*C. B. Lipman, Ph. D., *Prof. Plant Physiol.*
*‡W. W. Mackie, M. S., *Assoc. Agron.*
†J. C. Martin, B. S., *Asst. Chem. in Plant Nutr.*
*‡Alfred Smith, Ph. D., *Assoc. Prof. and Assoc. Soil Tech. (P. O., Davis).*
†R. E. Storie, B. S., *Asst. Soil Tech.*
*†T. F. Tavernetti, B. S., *Asst. Prof. Farm Pract. and Asst. to Dir. Branch Coll. of Agr. (P. O., Davis).*
‡W. W. Weir, *Asst. Drainage Engin. (Soils).*

Animal Industry:

*‡G. H. Hart, D. V. M., M. D., *Head Dir. of An. Husb. (P. O., Davis).*
*‡G. H. True, B. S., *Prof. An. Husb.*
†A. H. Folger, B. S., *in charge Advanced Registry Work (P. O., Davis).*
‡H. R. Guilbert, M. S., *Junior An. Husb. (P. O., Davis).*
*†C. E. Howell, M. S., *Assoc. An. Husb. (P. O., Davis).*
*‡E. H. Hughes, M. S., *Assoc. Prof. and Assoc. An. Husb. (P. O., Davis).*
*†S. W. Mead, M. S., *Asst. An. Husb. (P. O., Davis).*
*‡R. F. Miller, M. S., *Assoc. Prof. and Assoc. An. Husb. (P. O., Davis).*
*‡W. M. Regan, A. M., *Assoc. Prof. and Assoc. An. Husb. (P. O., Davis).*
*‡J. F. Wilson, M. A., *Asst. Prof. and Assoc. An. Husb. (P. O., Davis).*

Botany:

*‡W. A. Setchell, Ph. D., *Prof. Bot.*
*‡H. S. Reed, Ph. D., *Prof. Plant Physiol.; Plant Physiol. (P. O., Riverside).*
*†H. A. Borthwick, M. A., *Research Asst. in Bot. (P. O., Davis).*
*W. F. Court, *Tech. Asst. in Bot.*
*R. M. Holman, Ph. D., *Assoc. Prof. Bot.*
*‡W. W. Robbins, Ph. D., *Assoc. Prof. Bot.; Bot. (P. O., Davis).*

Chemistry:

*†W. P. Kelley, Ph. D., *Prof. Agr. Chem.; Agr. Chem. (P. O., Riverside).*
*‡C. S. Bisson, Ph. D., *Prof. Chem.; Chem. (P. O., Davis).*
‡S. M. Brown, *Junior Chem. (P. O., Riverside).*
†H. D. Chapman, Ph. D., *Asst. Chem. (P. O., Riverside).*
*J. G. Sewell, B. S., *Assoc. in Chem. (P. O., Davis).*

Chemistry—Continued.

†E. E. Thomas, B. S., *Asst. Chem. (P. O., Riverside).*
‡A. P. Vanselow, Ph. D., *Junior Chem. (P. O., Riverside).*

Dairy Industry:

*†C. L. Roadhouse,[1] D. V. M., *Head of Div. (P. O., Davis)*
†F. H. Abbott, B. S., *Assoc. in Dairy Indus. (P. O., Davis).*
‡G. E. Gordon, B. S., *Dairy Specialist.*
*†C. S. Mudge, Ph. D., *Assoc. Prof. Dairy Indus.; Assoc. Bact. (P. O., Davis).*
*†D. H. Nelson, M. S., *Asst. Dairy Tech. (P. O., Davis).*
†C. A. Phillips, M. S., *Junior Dairy Tech. (P. O., Davis).*
†G. A. Richardson, M. S., *Assoc. in Dairy Indus. (P. O., Davis).*
*‡G. D. Turnbow, M. S., *Asst. Prof. Dairy Indus.; Asst. Dairy Tech. (P. O., Davis).*

Economics (Rural):

*†Elwood Mead,[1] D. E., LL. D., *Head Div. of Rural Institutions.*
*†R. L. Adams, M. S., *Prof. Farm Mgt.; Agr. Econ.*
‡E. W. Braun, M. A., *Agr. Econ. Specialist.*
*†H. E. Erdman, Ph. D., *Prof. Agr. Econ.; Agr. Econ.*
‡L. W. Fluharty, B. S., *Farm Mgt. Specialist.*
†Emil Rauchenstein, Ph. D., *Assoc. in Agr. Econ.*
†S. W. Shear, Ph. D., *Junior Agr. Econ.*
*†E. C. Voorhies, B. S., *Asst. Prof. and Assoc. Agr. Econ.*
*†David Weeks, M. S., C. E., *Assoc. in Agr. Econ.*
‡H. R. Wellman, Ph. D., *Agr. Econ. Specialist.*
†C. H. West, M. S., *Asst. Agr. Econ.*
‡F. R. Wilcox, B. S., *Farm Mgt. Specialist.*

Education (Agr.):

*F. L. Griffin, M. S., *Assoc. Prof. Agr. Ed. and Supvr. Nondegree Curriculum (P. O., Davis).*
*H. M. Skidmore, M. S., *Supvr. Agr. Teacher Training.*
*W. E. Berg, B. S., *Pubs. Secy.*
*H. M. Butterfield, M. S., *Supvr. Agr. Corresp. Courses.*
*O. J. Kern, *Asst. Prof. Agr. Ed.*

Engineering (Agr.):

——— ———, *Head of Div. (P. O., Davis).*
*†Frank Adams, A. M., *Head Irrig. Invest. and Pract.; Irrig. Econ. (P. O., Davis).*

[1] On leave.

Engineering (Agr.)—Continued.

•†S. H. Beckett, B. S., *Assoc. Prof. Irrig. Invest. and Pract.; Assoc. Irrig. Engin. (P. O., Davis).*

•†H. L. Belton, *Farm Building Technician (P. O., Davis).*

‡J. B. Brown, B. S., *Irrig. Specialist (P. O., Davis).*

†Frank Davis, B. S., *Junior Irrig. Engin. (P. O. Davis).*

†C. F. Dunshee, B. S., *Asst. Crop Irrig. (P. O., Davis).*

‡J. P. Fairbank, B. S., *Agr. Engin. Specialist (P. O., Davis).*

†A. W. Farrall, M. S., *Junior Agr. Engin. (P. O., Davis).*

•†Samuel Fortier, M. E., Sc. D., *Consult. Prof. Irrig. Invest. and Pract.*

†Vernon Givan, A. B., *Tech. Asst. (P. O., Davis).*

†A. H. Hoffman, E. E., *Assoc. Agr. Engin. (P. O., Davis).*

†M. R. Huberty, B. S., *Asst. Irrig. Engin. (P. O., Davis).*

†J. W. Jones, M. S., *Assoc. in Irrig. Invest. and Pract. (P. O., Biggs).*

†J. D. Long, B. S., *Junior Agr. Engin. (P. O., Davis).*

•†E. G. McKibben, M. S., *Asst. Prof. and Asst. Agr. Engin. (P. O., Davis).*

•†B. D. Moses, B. S., *Asst. Prof. and Assoc. Agr. Engin. (P. O. Davis).*

•†E. J. Stirniman, M. S., *Asst. Prof. and Assoc. Agr. Engin. (P. O., Davis).*

†C. M. Titus, M. A., *Assoc. Statistician (P. O., Davis).*

•†F. J. Veihmeyer, C. E., Ph. D., *Asst. Prof. Irrig. Invest. and Pract.; Assoc. Irrig. (P. O., Davis).*

•†H. A. Wadsworth, B. S., *Asst. Prof. Irrig. Invest. and Pract.; Asst. Irrig. Engin. (P. O., Davis).*

†J. S. Winters, B. S., *Assoc. in Irrig. Engin. (P. O., Davis).*

†R. Wray, *Asst. in Irrig. Invest. (P. O., Davis).*

Entomology:

•†W. B. Herms, M. A., *Head of Div. Prof. Parasitol.; Ent.*

†A. J. Basinger, M. S., *Asst. in Ent. (P. O., Riverside).*

†A. M. Boyce, M. S., *Asst. Ent. (P. O., Riverside).*

†Harold Compere, *Asst. in Ent. (P. O., Riverside).*

•†E. O. Essig, M. S., *Prof. Ent.; Ent.*

•†S. B. Freeborn, Ph. D., *Assoc. Prof. and Assoc. Ent. (P. O., Davis).*

†J. F. Laniman, M. S., *Research Asst. Ent. and Parasitol.*

•†H. J. Quayle, M. S., *Prof. Ent.; Ent. (P. O., Riverside).*

Entomology—Continued.

†E. W. Rust, A. B., *Parasite Collector (P. O., Riverside).*

†H. H. P. Severin, Ph. D., *Asst. Ent.*

•†H. S. Smith, M. A., *Assoc. Prof. and Ent. (P. O., Riverside).*

†R. H. Smith, Ph. D., *Assoc. Ent. (P. O., Riverside).*

•†T. I. Storer, Ph. D., *Assoc. Prof. and Assoc. Zool. (P. O., Davis).*

†P. H. Timberlake, B. A., *Assoc. Ent. (P. O., Riverside).*

†Jocelyn Tyler, M. A., *Research Asst. Ent.*

•E. C. Van Dyke, B. S., M. D., *Prof. Ent.*

•†G. H. Vansell, A. M., *Assoc. in Ent.; Junior Apiculturist (P. O., Davis).*

•C. W. Woodworth, M. S., *Prof. Ent.*

†F. H. Wymore, M. S., *Research Asst. Ent. and Parasitol. (P. O., Davis).*

Extension (Admin.):[1]

Director Crocheron *in charge.*

‡Harriet G. Eddy, A. B., *State Home Dem. Leader.*

‡Lillian D. Clark, *Asst. State Home Dem. Leader.*

‡T. C. Mayhew, B. S., *Asst. State Leader, Coast Counties.*

‡W. R. Ralston, B. S., *Asst State Club Leader.*

‡C. W. Rubel, B. S., *Asst. State Leader, Northern Counties.*

‡May Secrest, B. S., *Asst. State Home Dem. Leader.*

‡L. B. Smith, B. S., *Asst. State Leader, Southern Counties.*

‡F. M. Spurrier, B. S., *Asst. State Club Leader, Northern Counties.*

‡J. E. Tippett, B. S., *Asst. County Agt. Leader.*

‡W. G. Waterhouse, B. S., *Asst. State Club Leader, Coast Counties.*

‡W. T. Clarke, B. S., *Prof. Agr. Ext.*

‡Harold Ellis, *Information and Publicity.*

‡C. F. Elwood, B. S., *Asst. Prof. Agr. Ext.*

‡T. F. Hunt, B. S., *Assoc. Prof. Agr. Ext.*

‡W. J. Norton, Ph. G., *Visual Instruction.*

Forestry:

•†Walter Mulford, F. E., *Head of Div.*

•F. S. Baker, F. E., *Assoc. Prof. For.*

•Emanuel Fritz, M. E., M. F., *Assoc. Prof. For.*

•M. E. Krueger, M. S., *Assoc. Prof. For.*

‡Woodbridge Metcalf, M. S., *For. Specialist.*

•†H. E. Malmsten, B. S. F., *Asst. Prof. For.; Asst. Plant Ecologist.*

[1] For subject matter workers see the respective division, i. e., agronomy, animal industry, etc.

Forestry—Continued.

•†A. W. Sampson, Ph. D., *Assoc. Prof. For.; Plant Ecologist.*

•F. X. Schumacher, B. S., *Asst. Prof. For.*

Genetics:

•†E. B. Babcock, M. S., *Head of Dir.*

•R. E. Clausen, Ph. D., *Assoc. Prof. Genetics.*

•J. L. Collins, Ph. D., *Asst. Prof. Genetics.*

†J. W. Lesley, Ph. D., *Research Asst. in Genetics (P. O., Riverside).*

Home Economics:

•†Mrs. Agnes F. Morgan, Ph. D., *Chair. Dept. of Household Sci.; Research Assoc. in Nutr.*

•Mary F. Patterson, *Chair. Dept. of Household Art and Design.*

‡Jessie L. Decker, *Home Furnishing Specialist.*

‡Ethelyn M. Dodson, B. S., *Clothing Specialist.*

•Helen W. Fancher, *Assoc. in Household Art.*

•Hope M. Gladding, *Asst. Prof. Household Art and Design.*

•Lucile Johnson, Ph. D., *Asst. Prof. Household Sci.*

•Mae N. Lent, *Assoc. in Household Art.*

•Ruth E. Okey, Ph. D., *Asst. Prof. Household Sci.*

Horticulture:

•†H. J. Webber, Ph. D., *Prof. Subtrop. Hort.; Dir. Citrus Expt. Sta. (P. O., Riverside).*

•†F. T. Bioletti, M. S., *Head Dir. of Vit. and Fruit Products.*

•†J. W. Gregg, B. S., *Head Dir. of Landsc. Design.*

•†W. L. Howard, Ph. D., *Head Dir. of Pomol. (P. O., Davis).*

•†H. A. Jones, Ph. D., *Head Dir. of Truck Crops; Plant Breeder (P. O., Davis).*

•†L. D. Batchelor, Ph. D., *Prof. Orchard Mgt.; Hort. (P. O., Riverside).*

•†W. H. Chandler, Ph. D., *Prof. Pomol.; Pomol.*

†F. W. Allen, M. S., *Asst. Pomol. (P. O., Davis).*

•†J. P. Bennett, Ph. D., *Assoc. Prof. and Assoc. Plant Physiol.*

•†S. H. Cameron, M. S., *Instr. Subtrop. Hort.; Junior Plant Physiol.*

•†A. W. Christie, M. S., *Asst. Prof. Fruit Prod.; Assoc. Chem.*

•†I. J. Condit, B. S., *Assoc. in Subtrop. Hort.*

•†W. V. Cruess, B. S., *Assoc. Prof. Fruit Prod.; Chem.*

†L. H. Day, B. S., *Research Asst. in Hort. (P. O., Davis).*

Horticulture—Continued.

†W. P. Duruz, M. S., *Asst. Pomol. (P. O., Davis).*

†H. B. Frost, Ph. D., *Asst. Plant Breeder (P. O., Riverside).*

†A. H. Hendrickson, Ph. D., *Assoc. Pomol. (P. O., Davis).*

†M. J. Heppner, M. S., *Research Asst. in Pomol. (P. O., Davis).*

•†R. W. Hodgson, M. S., *Assoc. Prof. Subtrop. Hort; Assoc. Citriculturist.*

‡W. B. Hooper, B. S., *Specialist in Walnut Culture (P. O., Riverside).*

†J. H. Irish, B. S., *Junior Chem. in Hort.*

†H. E. Jacob, M. S., *Junior Vit. (P. O., Davis).*

•Katherine D. Jones, B. S., *Instr. Landsc. Design.*

†F. B. Lincoln, M. S., *Junior Plant Physiol.*

†P. F. Nichols, B. S., *Research Asst. in Fruit Prod.*

•†E. L. Overholser, Ph. D., *Asst. Prof. and Assoc. Pomol. (P. O., Davis).*

†E. R. Parker, M. S., *Research Asst. in Orchard Mgt. (P. O., Riverside).*

†O. H. Pearson, M. S., *Asst. in Plant Brdg. (P. O., Davis).*

†G. L. Philp, M. S., *Asst. Pomol. (P. O., Davis).*

•†E. L. Proebsting, Ph. D., *Asst. Prof. and Asst. Pomol. (P. O., Davis).*

•†J. T. Rosa, jr., Ph. D., *Asst. Prof. Truck Crops; Assoc. Plant Breeder (P. O., Davis).*

†Edna M. Russ, B. S., *Asst. in Pomol. (P. O., Davis).*

‡W. R. Schoonover, M. S., *Citriculture Specialist (P. O., Riverside).*

•H. W. Shepherd, B. S., *Asst. Prof. Landsc. Design.*

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†Harold Goss, B. S., *Junior Chem.*

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•†R. E. Smith, B. S., *Head of Div.*

•†J. T. Barrett, Ph. D., *Prof. Plant Path.; Plant Path. (P. O., Riverside).*

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- •†H. S. Fawcett, Ph. D., *Prof. Plant Path.; Plant Path. (P. O., Riverside).*
- †E. T. Bartholomew, Ph. D., *Assoc. Plant Path. (P. O., Riverside).*
- †M. C. Goldsworthy, M. S., *Research Asst. in Plant Path.*
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†E. L. Le Clerg, M. S., *Asst. Bot. and Plant Path.*
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•†R. T. Burdick, M. S., *Assoc. Prof. Rural Econ. and Sociol.; Assoc. in Rural Econ.*
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•H. M. Huckeby, B. S., *Instr. Irrig. Engin.*
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•Vieva A. Bigelow, B. S., *Asst. Prof. Home Econ.*
•Charlotte E. Carpenter,[2] Ph. B., *Assoc. Prof. Home Econ.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.
[2] On leave.

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*College faculty. †Station staff. ‡Extension staff

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†W. L. Slate, B. S., *Dir. of Sta.*
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*‡L. B. Crandall, B. S., *Prof. Apiculture and Bee Specialist.*

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*Christie J. Mason, B. Agr., *Instr. Bact.*
†C. A. Slanetz, Ph. D., *Asst. Bact.*

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*†E. W. Sinnott, Ph. D., *Prof. Bot. and Genetics. Dean Div. of Agr. Sci.*

[1] On leave.

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†L. C. Dunn, Sc. D., *Geneticist (Poultry).*
‡R. E. Jones, *Poultry Specialist.*
†Walter Landauer, Ph. D., *Asst. Geneticist (Poultry).*
*W. S. Moreland, B. S., *Instr. Poultry Husb.*
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*D. E. Warner, jr., B. S., *Assoc. Prof. Poultry Husb.*

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*†G. H. Lamson, jr., M. S., *Prof. Zool. and Ent; Zool.*
*J. A. Munter, B. S., *Asst. Prof. Ent.*
*†A. F. Schulze, M. S., *Instr. and Asst. Zool.*

Miscellaneous:
*R. E. Dodge, M. A., *Dean Two Year Course in Agr.*
*Edwina M. Whitney, Ph. B., *Libr.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

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†G. M. Gilligan, M. S., *Asst. Chem.*

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[1] On leave.

Economics (Agr.)—Continued.
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†H. S. Gabriel, Ph. D., *Asst. Agr. Econ.*
•H. V. Olsen, A. B., *Asst. Prof. Econ.*

Education (Agr.):
•R. W. Heim, A. M., *Prof. Voc. Agr. Ed.*

Entomology:
††H. L. Dozier, Ph. D., *Ent.*

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‡Mrs. Helen V. McKinley, B. S., *State Home Dem. Leader.*

Home Economics: [2]
•Ethel L. Parker,[3] M. A., *Prof. Home Econ.*
•Amy Rextrew, M. A., *Acty. Prof. Home Econ.*

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•Lottie B. Hart, B. S., *Instr. Home Econ.*
•Elizabeth G. Kelly, A. M., *Asst. Prof. Home Econ.*

Horticulture:
Dean McCue, *Head of Dept.*
•†L. R. Detjen, M. S., *Prof. and Assoc. Hort.*
•†G. F. Gray, M. S., *Instr. and Asst. Hort.*
†F. S. Lagassé, M. S., *Research Hort.*

Plant Pathology:
•††T. F. Manns, Ph. D., *Prof. Plant Path. and Soil Bact.; Plant Path. and Soil Bact.*
††J. F. Adams, Ph. D., *Assoc. Plant Path. and Specialist in Truck Crops and Plant Path.*

Miscellaneous:
•††Mrs. Florence Fader, *Secy.*
†Freda Ritz, *Libr.*

State College for Colored Students, *Dover*

•Agricultural faculty

•R. S. Grossley, B. S., LL. D., *President*
•A. T. Wood, B. S., *Dir. of Agr. Instr. Chem.*

•Jeanette W. Boyer, A. M., *Libr.*
•Florence G. Brooks, Phar. C., *Home Econ.*
•Helen B. Grossley, A. M., *Dir. Home Econ.*
•E. C. Rhodes, *Instr. Mech. Arts.*

FLORIDA

College of Agriculture and the Agricultural Experiment Station of the University of Florida, *Gainesville*

•College faculty. †Station staff. ‡Extension staff

———— ————, *President of University.*
•††Wilmon Newell, M. S., D. Sc., *Dean Coll. of Agr., Dir. of Sta., Dir. of Agr. Ext. Div.*

Agronomy:
†W. E. Stokes, M. S., *Agron.*
•O. C. Bryan, Ph. D., *Prof. Agron.*
†C. R. Enlow, M. S., *Asst. Agron. (Coop. U. S. D. A.)*
†F. H. Hull, M. S., *Asst. Agron.*
†A. S. Laird, M. S., *Asst. Agron.*
†W. A. Leukel, Ph. D., *Assoc. Agron.*
•G. E. Ritchey, M. S., *Instr. Farm Crops*

Animal Industry:
†J. M. Scott, B. S., *An. Indus. and Vice Dir. of Sta.*
•C. H. Willoughby, B. Agr., M. A., *Prof. An. Husb. and Dairying*
•N. W. Sanborn, M. D., *Prof. Poultry Husb.*
‡H. L. Brown, B. S., *Ext. Dairyman*
•F. G. Martin, M. S., *Instr. Dairying.*
‡N. R. Mehrhof, B. S., M. Agr., *Poultry Specialist.*

Botany—*See* **Horticulture.**

Chemistry:
†R. W. Ruprecht, Ph. D., *Chem.*
†R. M. Barnette, Ph. D., *Asst. Chem. (Soil Invest.).*
†C. E. Bell, M. S., *Asst. Chem.*
•A. P. Black, A. B., *Prof. Agr. Chem.*
†J. M. Coleman, B. S., *Asst. Chem.*
†J. B. Hester, B. S., *Asst. Chem.*
•V. T. Jackson, Ph. D., *Assoc. Prof. Agr. Chem.*
†H. L. Marshall, M. S., *Asst. Chem.*

Economics (Agr.):
†C. V. Noble, Ph. D., *Head of Dept.*
•J. E. Turlington, Ph. D., *Prof. Agr. Econ.*
†M. A. Brooker, M. S., *Asst. Agr. Econ.*
•F. W. Brumley, M. S., *Instr. Farm Mgt.*
•H. G. Hamilton, M. S., *Asst. Prof. Mktg.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.
[2] Given in the Women's College.
[3] On leave.

Economics (Agr.)—Continued.
†Bruce McKinley, B. S., *Asst. Agr. Econ.*
•D. E. Timmons, M. S., *Instr. Farm Acct.*

Editorial—*See* **Journalism.**

Education (Agr.):
•E. W. Garris, Ph. D., *Prof. Agr. Ed.*

Engineering (Agr.):
•Frazier Rogers, B. S., *Prof. Agr. Engin.*

Entomology:
†J. R. Watson, M. A., *Ent.*
†E. D. Ball, Ph. D., *Assoc. Ent.* (*P. O., Sanford*).
†H. E. Bratley, M. S., *Asst. Ent.* (*Pecan Invest.*).
†E. F. Grossman, M. A., *Asst. Ent.* (*Cotton Invest.*).
†A. N. Tissot, M. S., *Asst. Ent.*
†F. W. Walker, *Asst. Ent.* (*Pecan Invest.: P. O., Monticello*).

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‡Flavia Gleason, *State Home Dem. Agt.* (*P. O., Tallahassee*).
‡R. W. Blacklock, A. B., *State Club Leader.*
‡Virginia P. Moore, *Asst. State Home Dem. Agt.* (*P. O., Tallahassee*).

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†C. F. Ahmann, Ph. D., *Physiol. in Home Econ. Invest.*
†L. W. Gaddum, Ph. D., *Biochem. in Home Econ. Invest.*
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‡Isabelle S. Thursby, B. S., *Food and Mkty. Agt.*

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†G. H. Blackmon, M. S., *Pecan Culturist.*
•A. B. Burritt, A. B., M. L. A., *Assoc. Prof. Landsc. Design.*
†A. F. Camp, Ph. D., *Assoc. Hort.*
•W. R. Carroll, M. S., *Asst. Prof. Bot. and Bact.*
•M. D. Cody, M. A., *Prof. Bot. and Bact.*
†M. R. Ensign, M. S., *Asst. Hort.*
•E. L. Lord, B. S., *Prof. Hort.*
†Harold Mowry, *Asst. Hort.*
†C. B. Van Cleef, M. S., *Greenhouse Foreman.*
•J. V. Watkins, B. S., *Asst. in Hort.*

Journalism:
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††‡J. F. Cooper, B. S., *Editor.*
•Elmer Emig, M. A., *Asst. Prof. Agr. Journalism.*
†E. G. Moore, M. S., *Asst. Editor.*

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———, *Head of Dept.*
†A. N. Brooks, Ph. D., *Assoc. Plant Path.* (*Strawberry Invest.: P. O., Plant City*).
‡E. F. DeBusk, B. S., *Ext. Citrus Path.*
•R. D. Dickey, B. S., *Instr. Plant Path. and Econ. Ent.*
†L. O. Gratz, Ph. D., *Assoc. Plant Path.* (*P. O., Hastings*).
•John Gray, M. S., *Prof. Plant Path. and Econ. Ent.*
†Stacy Hawkins, A. B., *Field Asst. in Plant Path.* (*P. O., Homestead*).
†D. G. A. Kelbert, *Field Asst. in Plant Path.* (*P. O., Bradenton*).
†W. A. Kuntz, A. M., *Asst. Plant Path.* (*Coop. U. S. D. A.: P. O., Lake Alfred*).
†K. W. Loucks, B. S., *Asst. Plant Path.*
†R. E. Nolen, M. S., *Field Asst. in Plant Path.* (*P. O., Monticello*).
†A. S. Rhoads, Ph. D., *Assoc. Plant Path.* (*P. O., Cocoa*).
†G. F. Weber, Ph. D., *Assoc. Plant Path.*
†Erdman West, B. S., *Mycol.*

Plant Physiology:
†W. A. Carver, Ph. D., *Asst. Cotton Specialist.*
†R. M. Crown, B. S., *Field Asst. in Cotton Invest.*
†M. N. Walker, Ph. D., *Asst. Cotton Specialist.*

Veterinary Science:
•†A. L. Shealy, B. S., D. V. M., *Prof. Vet. Sci.; Vet.*
†D. A. Sanders, B. S., D. V. M., *Asst. Vet.*
†E. F. Thomas, D. V. M., *Lab. Asst. in Vet.*

Miscellaneous:
†Mrs. Ida K. Cresap, *Libr.*
†S. T. Fleming, A. B., *Asst. to Sta. Dir.*
•††K. H. Graham, *Business Mgr.*
•A. W. Leland, *Farm Foreman.*
†Henry Zeigler, *Farm Foreman.*

Substations:
Citrus Expt. Sta., *P. O., Lake Alfred*—
J. H. Jefferies, *Supt.*
W. L. Thompson, B. S., *Asst. Ent.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

Substations—Continued.

Everglades Expt. Sta., *P. O., Belle Glade*—
R. V. Allison, Ph. D., *Soils Specialist.*
H. E. Hammar, M. S., *Field Asst.*
J. H. Hunter, M. S., *Asst. Agron.*
J. L. Seal, Ph. D., *Assoc. Plant Path.*
G. E. Tedder, *Foreman.*

Substations—Continued.

Tobacco Expt. Sta., *P. O., Quincy*—
W. R. Tisdale, Ph. D., *Plant Path., in charge Tobacco Invest.*
Jesse Reeves, *Foreman.*
R. F. Wadkins, M. S., *Lab. Asst.*

Florida Agricultural and Mechanical College for Negroes, *Tallahassee*

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•J. C. Baldwin, B. S., *Agr.*
•Hattie Britt, *Handicrafts.*
•C. H. Chapman, *An. Husb. and Dairying.*
•Irma L. Coleman, *Instr. Dom. Sci.*
•N. G. B. Cooper, R. N., *Supt. Nurse Training School.*
•E. M. Griggs, B. S., *Dean Home Econ. Dept.*
•L. A. Marshall, B. S., *Agr. Chem.*
•Clementina B. Nelson, B. S., *Dom. Sci.*
•R. L. Reynolds, B. S., *Smith-Hughes Agr.*
‡A. A. Turner, *Farmers' Club Organizer.*
•E. E. Ware, B. S., *Prof. Biol. Chem.*
•E. C. Weare, *Libr.*
•J. D. Wray, M. S., *Agr.*

GEORGIA

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Agronomy:

•‡J. R. Fain, Sc. D., *Prof. Agron. and Farm Mgt.*
•G. A. Crabb, B. S., *Prof. Agron. in charge Soils.*
•R. R. Childs, M. S., *Prof. Agron. in charge Cotton Indus. (Coop. U. S. D. A.).*
‡E. D. Alexander, M. S., *Farm Crops Specialist and in charge Corresp. Courses.*
‡L. V. Davis, B. S., *Supvr. Fert. Invest.*
‡J. W. Firor, B. S., *State Agt. in Mktg.*
‡W. A. Minor, B. S., *Farm Mgt. Specialist.*
•Paul Tabor, M. S., *Assoc. Prof. Agron. in charge Farm Crops.*
‡Kenneth Treanor, B. S., *Farm Mgt. Specialist.*
•P. O. Vanatter, *Supt. Field Expts.*
‡F. C. Ward, B. S., *Pure Seed Specialist.*
‡E. C. Westbrook, B. S., *Cotton and Tobacco Specialist.*

Animal Industry:

•‡M. P. Jarnagin, Sc. D., *Prof. An. Husb.*
•‡J. H. Wood, B. S., *Prof. Poultry Husb.*
•F. W. Bennett, B. S., *Assoc. Prof. An. Husb.*

Animal Industry—Continued.

‡W. P. Clarke, B. S., *Field Agt. in Poultry Husb.*
‡F. W. Fitch, B. S., *Field Agt. in Dairy Husb.*
•C. E. Kellogg, B. S., *Assoc. Prof. An. Husb.*
‡L. H. Marlatt, *Field Agt. in Cheese Prod.*
‡C. E. Mitchell, B. S., *Supvr. Egg-laying Contests.*
•J. S. Moore, B. S., *Instr. Poultry Husb.*
‡W. G. Owens, B. S., *Field Agt. in Swine Indus.*
•W. S. Rice, B. S., *Assoc. Prof. An. Husb.*
‡R. J. Richardson, B. S., *Field Agt. in Poultry Husb.*

Botany:

•J. M. Rende, Ph. D., *Prof. Bot. and Dir. of Biol. Labs*

Chemistry:

•L. M. Carter, B. S., *Prof. Agr. Chem.*
•M. E. Brand, B. S., *Adjunct Prof. Soil Chem.*
•W. O. Collins, B. S., *Assoc. Prof. Soil Chem.*
‡G. L. Fuller, B. S., *Soil Specialist in State Survey.*
•M. W. Lowry, M. S., *Assoc. Prof. Soil Chem.*

Chemistry—Continued.
- •H. C. White, Ph. D., Sc. D., *Prof. Chem.*
- •C. N. Wilder, M. S., *Assoc. Prof. Agr. Chem.*
- •R. C. Wilson, Ph. G., *Prof. Pharm. and Materia Medica.*

Economics (Agr.)—*See* **Agronomy.**

Editorial:
- •‡R. M. Soule, B. S., *Editor.*
- ‡Laura E. Blackshear, *Illustrator and in charge Educational Exhibits.*
- E. P. Soule, *Mgr. Radio Sta.*

Education (Agr.):
- •J. T. Wheeler, M. S., *Prof. Agr. Ed.*
- •W. W. Reitz, M. S., *Assoc. Prof. Agr. Ed.*
- •P. W. Chapman, B. S., *State Dir. Voc. Ed.*
- •M. D. Mobley, B. S., *Assoc. Prof. Agr. Ed.*
- •L. M. Sheffer, B. S., *Assoc. State Supvr. Voc. Ed.*
- •J. H. Wilson, B. S., *Assoc. Prof. Agr. Ed., in charge Practice School.*

Engineering (Agr.):
- •‡S. P. Lyle, M. S. A. E., *Prof. Agr. Engin.*
- ‡W. E. Broach, B. S., *Field Agt. in Agr. Engin.*
- •W. A. Clegg, M. S., *Assoc. Prof. Agr. Engin.*

Extension (Admin.):[1]
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- ‡J. G. Oliver, B. S., *State Supvr. County Agts.*
- ‡Mrs. Lelia R. Mize, B. S., *State Agt. Home Dem. Work.*
- ‡G. V. Cunningham, B. S., *State Supvr. Agr. Clubs.*
- ‡Lurline Collier, B. S., *State Agt. Girls' Club Work.*
- ‡William Bradford, A. B., M. D., *Asst. State Supvr. Agr. Clubs.*

Forestry:
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- ‡DuPre Barrett, B. S. F., *Field Agt. in For.*
- •L. E. Sawyer, B. S. F., *Assoc. Prof. For.*

Home Economics:
- •‡Mary E. Creswell, B. S., *Dir. of Home Econ.*

Home Economics—Continued.
- •Susie Burson, B. S., *Asst. State Supvr. Voc. Home Econ.*
- •Matilda Callaway, B. S., *Adjunct Prof. Home Econ.*
- •Epsie Campbell, B. S., *State Supvr. Voc. Home Econ.*
- •Edith V. Creswell, B. S., *Assoc. Prof. Home Econ.*
- ‡Willie V. Dowdy, B. S., *Home Improvement Specialist.*
- •Edith Hanson, B. S., *Adjunct Prof. Home Econ.*
- •Rachael L. Keith, B. S., *Adjunct Prof. Home Econ.*
- •Mildred Ledford, B. S., *Adjunct Prof. Applied Arts.*
- ‡Martha I. McAlpine, A. B., *Child Study Specialist.*
- •Susan J. Mathews,[2] B. S., *Food and Nutr. Specialist.*
- •Catherine Newton,[2] M. S., *Assoc. Prof. Food and Nutr.*
- •Rhea C. Scott, B. S., *Assoc. Prof. Institutional Mgt., in charge of Cafeteria.*

Horticulture:
- •‡T. H. McHatton, H. M., Sc. D., *Prof. Hort.*
- ‡G. H. Firor, B. S., *Field Agt. in Hort.*
- ‡H. W. Harvey, B. S., *Landsc. Gard. Specialist.*
- •R. L. Keener, B. S., *Assoc. Prof. Hort.*
- ‡H. M. McKay, M. S., *Field Agt. in Hort.*
- ‡R. M. Middleton,[2] B. S., *Mktg. Specialist.*

Veterinary Medicine:
- •‡A. G. G. Richardson, D. V. M., *Prof. Vet. Med.*
- •W. C. Burkhart, D. V. M., *Assoc. Prof. Vet. Med.*
- •R. W. Jones, D. V. M., *Assoc. Prof. Vet. Med.*
- •W. F. McLendon, D. V. M., *Assoc. Prof. Vet. Med.*
- •H. V. Persells, D. V. M., *Assoc. Prof. Vet. Med.*
- •J. E. Severin, D. V. M., *Assoc. Prof. Vet. Med.*

Miscellaneous:
- •Nelle M. Reese, *Libr.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

[2] In cooperation with the Georgia experiment station.

Georgia Experiment Station, *Experiment (telegraph and express address, Griffin)*

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†R. P. Bledsoe, M. S., *Agron.*
†F. R. Edwards, M. S., *An. Husb.*
†W. G. Friedemann, Ph. D., *Chem.*
†B. B. Higgins, Ph. D., *Bot., Plant Path.*
†J. E. Bailey, B. S., *Asst. Hort.*
†H. K. Brabham, *Asst. Agron.*
†W. L. Brown, B. S., *Asst. Chem.*
†R. C. Campbell, M. S., *Cotton Fiber Specialist.*
†W. T. Fullilove, B. S., *Cotton Mktg. Invest.*
†G. A. Hale, M. A., *Asst. Agron.*
†K. T. Holley, B. S., *Assoc. Chem.*
†B. M. Jackson, *Asst. An. Husb.*
†L. H. Jones, *Asst. Agron.*
†Sarah L. Kilpatrick, *Libr. and Secy.*
†Susan J. Mathews,[1] B. S., *Food and Nutr. Specialist.*
†R. M. Middleton,[1] B. S., *Peach Mktg. Invest.*
†Catherine Newton,[1] M. S., *Nutr. Specialist.*
†Frank Van Haltern, M. S., *Assoc. Bot. (Coop. with Coastal Plain Expt. Sta.: P. O., Tifton).*
†J. G. Woodroof, M. S., *Assoc. Hort.*
†Mrs. Naomi C. Woodroof, M. S., *Asst. Bot., Plant Path.*

Georgia Coastal Plain Experiment Station, *Tifton*

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†Fred Bell, *Farm. Supt.*
†J. M. Carr, B. S., *Tobacco Specialist (Coop. U. S. D. A.).*
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†J. L. Stephens, B. S., *Asst. Agron.*
†R. C. Thomas, M. S., *Path. (Coop. U. S. D. A.).*
†Otis Woodard, B. S., *Hort.*

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•J. S. Frazier, *Instr. Dairying and Poultry.*
•H. E. Hall, *Instr. Voc. Agr.*
•Howard Jackson, *Instr. Laundering.*
‡P. H. Stone, *Asst. State Agt.*
‡A. Tabor, *Supvr. Agr. Ed. in Negro Schools.*
‡Camilla Weems, *State Home Dem. Agt.*
•Mrs. W. P. White, *Instr. Sewing.*
‡E. A. Williams, *State Agt.*
•Mrs. Mamie Williams, *Instr. Dom. Sci.*

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Agricultural Experiment Station, *Guam, Island of Guam*

Under supervision of the Office of Experiment Stations, United States Department of Agriculture

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†Joaquin Guerrero, *Asst. in Hort.*
†Peter Nelson, *Admin. Asst.*
†S. R. Vandenberg, B. S., *Ent.*

[1] In cooperation with the Georgia State College of Agriculture.

HAWAII

University of Hawaii (Divisions of Agriculture and Home Economics), *Honolulu*

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•F. E. Armstrong, M. S., *Prof. Agr. Ed.*
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•H. F. Bergman, Ph. D., *Prof. Bot.*
•C. M. Bice, B. S., *Instr. Poultry Husb.*
•E. M. Bilger, Ph. D., *Asst. Prof. Chem.*
•E. H. Bryan, jr., M. S., *Instr. Ent.*
•Anna von B. Dahl, *Asst. Prof. Textiles.*
•F. T. Dillingham, M. A., *Prof. Chem. and Sugar Tech.*
•C. H. Edmondson, Ph. D., *Prof. Zool. and Dir. Marine Biol. Lab.*
•D. M. L. Forbes, B. S., *Dir. Agr. Ext.*
•Gichi Fujimoto, M. S., *Instr. Chem.*
•C. A. Hannum, M. S., *Instr. Zool.*
•Clara F. Hemenway, *Libr.*
•L. A. Henke, M. S., *Prof. Agr.*
•Paul Kirkpatrick, Ph. D., *Prof. Phys.*
•F. G. Krauss,[1] D. Sc., *Prof. Agron. and Genetics.*
•W. R. McAllep, *Lect. on Sugar Mfg.*
•M. C. Magarian, M. A., *Instr. Phys.*
•Carey D. Miller, M. S., *Asst. Prof. Food and Nutr.*
•Leonora Neuffer, Ph. D., *Actg. Prof. Chem.*
•J. M. Ostergaard, *Asst. in Zool.*
•Robert Pahau, B. S., *Supt. Waiakea Farm (P. O., Hilo).*
•H. S. Palmer, Ph. D., *Prof. Geol.*
•Louise P. Sooy, *Prof. Household Art.*
•Richard Wrenshall,[1] Ph. D., *Prof. Chem.*

Experiment Station of the Association of Hawaiian Pineapple Canners[2]

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F. A. E. Abel, M. S., *Asst. Chem.*
W. A. Baldwin, Ph. B., *Asst. Agr.*
F. A. Bowers, B. S., *Asst. Agr.*
H. L. Denison, B. S., *Agr.*
F. T. Dillingham, M. A., *Chem.*
C. A. Farden, B. S., *Asst. Chem.*
G. H. Godfrey, Ph. D., *Nematologist.*
J. M. Horner, A. B., *Asst. Chem.*
J. F. Illingworth, Ph. D., *Ent.*
Mary Kamm, B. S., *Asst. Path.*
Kenneth Kerns, B. S., *Asst. Geneticist.*
Beatrice H. Krauss,[1] B. S., *Asst. Physiol.*
Helene T. Morita, B. S., *Asst. Nematologist.*
G. E. Paxton, M. S., *Asst. Path.*
C. P. Sideris, Ph. D., *Physiol. and Path.*
H. O. Thompson, B. S., *Asst. Agr.*
Gwendolyn C. Waldron, B. S., *Asst. Path.*
W. A. Wendt, B. S., *Asst. Agr.*

Agricultural Experiment Station, *Honolulu*

Under supervision of the Office of Experiment Stations, United States Department of Agriculture

†Station staff. ‡Extension work

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†John Castro, *Plant Propagator.*
†H. L. Chung, M. S., *Agron.*
‡R. A. Goff, B. S., *Ext. Agt. for Island of Hawaii (P. O., Hilo).*
‡Mabel Greene, *Ext. Agt. in Club Work.*
†E. D. W. Ho, Ph. D., *Lab. Asst. in Chem.*
†R. K. Lum, B. S., *Junior Trop. Econ.*
†W. T. Pope, M. S., *Hort.*
†J. C. Ripperton, D. Sc., *Chem.*
‡H. F. Willey, *Supt. Dem. Farm (P. O., Makaweo).*

[1] On leave.
[2] Under the management of the University of Hawaii.

Experiment Station, Hawaiian Sugar Planters' Association, *Honolulu*

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†C. C. Barnum, B. S., *Asst. Path.*
†A. Brodie, M. A. S., *Tech. Chem.*
†H. W. Brodie, *Asst. in For.*
†L. W. Bryan, B. S., *For. Supvr. (Hilo Project).*
†Royden Bryan, *Asst. Agr.*
†C. W. Carpenter, *Asst. Path.*
†G. H. Cassidy, *Asst. Nematologist.*
†E. L. Caum, *Asst. Bot.*
†H. A. Cook, A. B., *Asst. Chem.*
†A. H. Cornelison, *Asst. Agr.*
†C. L. Crutchfield, *Asst. Chem.*
†U. K. Das, *Asst. Agr.*
†L. E. Davis, *Asst. Chem.*
†F. C. Denison, *Asst. Agr.*
†Herbert Deverill, *Asst. Agr.*
†R. E. Doty, *Asst. Agr.*
†J. H. Duffy, *Asst. Chem.*
†Albert Duval, *Asst. in For.*
†V. Eremeef, *Asst. Agr.*
†Allister Forbes, *Asst. Agr.*
†F. C. Haddon, *Asst. Ent.*
†F. E. Hance, *Assoc. Chem.*
†Fred Hansson, Ph. B., *Asst. Chem.*
†R. H. King, B. S., *Asst. Chem.*
†Y. Kutsunai, B. S., *Asst. Agr.*
†C. G. Lennox, *Asst. Geneticist.*
†H. L. Lyon, Ph. D., *in charge Dept. of Bot. and For.*
†W. R. McAllep, *Sugar Tech.*
†W. L. McCleery, *Asst. Sugar Tech.*
†G. A. McEldowney, *For. Supvr. (Oahu Project).*
†W. T. McGeorge, M. S., *Assoc. Chem.*
†R. C. McLennan, *Asst. Agr.*
†A. J. Mangelsdorf, D. Sc., *Geneticist.*
†J. P. Martin, M. S., *Asst. Plant Path.*
†F. Muir, *Ent.*
†Carl Nesbitt, *Asst. Chem.*
†C. E. Pemberton, *Asst. Ent.*
†R. C. L. Perkins, D. Sc., *Consult. Ent.*
†H. R. Shaw, *Asst. Agr.*
†Twigg Smith, *Illustrator.*
†H. K. Stender, B. S., *Asst. Agr.*
†G. R. Stewart, B. S., *Chem.*
†O. H. Swezey, M. S., *Ent.*
†F. R. Van Brocklin, B. Ch., *Asst. Chem.*
†R. H. Van Zwaluwenburg, B. S., *Asst. Ent.*
†J. A. Verret, B. S., *Agr.*
†A. J. Watt, jr., *Asst. Agr.*
†D. M. Weller, *Histol.*
†F. X. Williams, Sc. D., *Asst. Ent.*
†J. E. Wist, *Supt. Vineyard Street Nursery.*

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College of Agriculture and the Agricultural Experiment Station of the University of Idaho, *Moscow*

•College faculty. †Station staff. ‡Extension staff

——— ———, Ph. D., *President of University.*
•†‡E. J. Iddings, M. S., *Dean Coll. of Agr., Dir. of Sta., Dir. of Ext. Div.*

Agronomy:
•†H. W. Hulbert, M. S., *Prof. Agron.; Agron.*
††C. B. Ahlson, B. S., *Field Agron. and Seed Comr. (P. O., Boise).*
††Jessie C. Ayres, A. B., *State Seed Analyst (P. O., Boise).*
†L. F. Burkhart, *Field Supt.*
•†G. R. McDole, M. A., *Assoc. Prof. Agron.; Soil Tech.*
‡L. D. Raeder, B. S., *Asst. Field Agron. (P. O., Boise).*
•†J. D. Remsberg, jr., M. S., *Instr. and Asst. Agron.*

Animal and Poultry Husbandry:
•†C. W. Hickman, B. S., *Prof. An. Husb.; An. Husb.*
•†C. E. Lampman, B. S., *Prof. Poultry Husb.; Poultry Husb.*
†R. F. Johnson, B. S., *Asst. in Feeding Invest.*

[1] On leave.

Animal and Poultry Husbandry—Continued.
•†F. E. Moore, B. S., *Asst. Poultry Husb.*
‡Pren Moore, *Poultry Specialist (P. O., Boise).*
•†J. E. Nordby, M. S., *Assoc. Prof. and Asst. An. Husb.*
††E. F. Rinehart, B. S., *Asst. and Field An. Husb. (P. O., Boise).*

Bacteriology:
•†G. L. A. Ruehle, M. S., *Prof. Bact.; Bact.*
†I. A. Anderson, B. S., *Asst. in Bact.*
•†C. C. Prouty, M. S., *Asst. Bact.*
†G. S. Schilling, M. S., *Asst. Bact. (An. Path.).*

Botany:
•F. W. Gail, Ph. D., *Prof. Bot.*
•R. A. Dietert, M. S., *Asst. Prof. Bot.*
•Herma Albertson, B. S., *Instr. Bot.*

Chemistry:

- *†R. E. Neidig,[1] Ph. C., M. S., *Prof. Agr. Chem.; Chem.*
- *†P. S. Billington, B. S., *Asst. in Chem.*
- †W. B. Bollen, Ph. D., *Asst. Agr. Chem.*
- *L. C. Cady, M. S., *Asst. Prof. Chem.*
- *W. H. Cone, B. S., *Asst. Prof. Chem.*
- *D. D. DuSault, M. S., *Asst. Prof. Chem.*
- *J. A. Kostalek, Ph. D., *Prof. Org. Chem.*
- †H. P. Magnuson, M. S., *Actg. Chem. in Soil Chem.*
- *A. W. Martin, B. S., Ch. E., *Instr. Chem.*
- *†R. S. Snyder, M. S., *Asst. Prof. Agr. Chem.; Assoc. Chem.*
- *C. L. von Ende, Ph. D., *Prof. Chem.*

Dairy Husbandry:

- *†F. W. Atkeson, B. S., *Prof. Dairy Husb.; Dairy Husb.*
- *†G. C. Anderson, B. S., *Instr. and Asst. in Dairy Husb.*
- ‡D. L. Fourt, B. S., *Field Dairyman (P. O., Boise).*
- *†H. C. Hansen, M. S., *Asst. Prof. and Asst. Dairy Husb.*
- †H. A. Mathiesen, B. S., *Agt. in Dairying (Coop. U. S. D. A.: P. O., Boise).*
- *†D. R. Theophilus, M. S., *Assoc. Prof. Dairy Mfrs.; Asst. Dairy Husb.*

Economics (Agr.):

- *†R. H. Engle, Ph. D, *Assoc. Prof. Statistics; Econ.*
- †G. L. Sulerud, M. A., *Asst. Agr. Econ.*
- †C. F. Wells, M. S., *Statistical Analyst (P. O., Boise).*

Editorial:

- ††Alan Dalley, B. S., *Agr. Editor.*
- *E. F. Mason, B. Lit., *Dir. of Pubs.*

Education (Agr.):

- *H. E. Lattig, M. S., *Assoc. Prof. Agr. Ed. and Prin. School of Pract. Agr.*
- *B. L. Brigham, B. S., *Supvr. Pract. Teaching in Agr.*

Engineering (Agr.):

- *†M. R. Lewis, B. S., C. E., *Prof. Agr. Engin.; Agr. Engin. and Irrig.*
- *†A. D. Edgar, B. S., *Asst. Prof. and Asst. Agr. Engin.*
- *†E. N. Humphrey, *Asst. in Agr. Engin.*

Entomology:

- ‡W. E. Crouch, B. S., *Rodent Control Specialist (P. O., Boise).*
- †R. W. Haegele, A. B., *Asst. Ent. (P. O., Twin Falls).*
- *‡W. E. Shull, B. S., *Asst. Prof. Ent.*

Entomology—Continued.

- ††Claude Wakeland, M. S., *Ent. (P. O., Parma).*
- *‡F. E. Whitehead,[1] M. S., *Assoc. Prof. Ent.*

Extension (Admin.):[2]

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- ‡J. H. Rearden, B. S., *County Agt. Leader and State Club Leader.*
- ‡Marion M. Hepworth, B. S., *State Home Dem. Leader and Nutr. Specialist.*

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- *†F. G. Miller, M. F., *Dean School of For.*
- *E. E. Hubert, Ph. D., *Prof. For Products.*
- *H. I. Nettleton, B. S. F., *Instr. For.*
- ‡A. M. Sowder, M. S. F., *For. Specialist.*
- *T. G. Taylor, M. F., *Asst. Prof. Silviculture.*
- *E. G. Wiesehuegel, B. S. F., *Instr. For.*

Home Economics:[3]

- *Katherine Jensen, M. S., *Prof. Home Econ., Dir. Home Econ. Curriculum.*
- †Ella Woods, Ph. D., *Home Econ.*
- ‡Marjorie Eastman, A. M., *Clothing and Home Mgt. Specialist (P. O., Boise).*
- *Dorothy G. Ellis, M. A., *Assoc. Prof. Home Econ.*
- *Ida Ingalls, M. A., *Asst. Prof. Home Econ.*
- *Elizabeth Johnson, B. S., *Asst. Prof. Art and Design.*
- *Adah Lewis, M. S., *Assoc. Prof. Home Econ.*
- *Jessie B. Thornber, B. S., *Supvr. Pract. Teaching in Home Econ.*
- *Leah Tuttle, *Asst. in Home Econ.*

Horticulture:

- *†C. C. Vincent, M. S., *Prof. Hort.; Hort.*
- *†T. H. Ashlee, *Florist.*
- ‡E. R. Bennett, M. H., *Field Hort. (P. O., Boise).*
- *†L. E. Longley,[1] M. S., *Assoc. Prof. and Asst. Hort.*
- *†Leif Verner, M. S., *Asst. Prof. and Asst. Hort.*

Plant Pathology:

- *†C. W. Hungerford, Ph. D., *Prof. Plant Path.; Plant Path. (Coop. U. S. D. A.).*
- †W. H. Pierce, M. S., *Asst. Plant Path.*
- †J. M. Raeder, M. S., *Assoc. Plant Path. (Coop. U. S. D. A.).*

[1] On leave.

[2] For subject-matter workers see the respective division, i. e., agronomy, animal and poultry husbandry, etc.

[3] Given in College of Letters and Science.

Veterinary Science:
- *†B. L. Taylor, D. V. M., *Asst. Prof. Vet. Sci.; Vet.*

Zoology:
- *J. E. Wodsedalek, Ph. D., *Prof. Zool.*

Miscellaneous:
- *†‡Mrs. Grace B. Raeder, *Executive Secy.*
- *†Mary B. Sweet, B. L. S., *Instr. Libr. Sci.; Libr.*

Substations:
- Aberdeen—A. E. McClymonds, B. S., *Supt.*
- Caldwell—D. A. Stubblefield, *Supt.*
- Felt (High Altitude)—W. A. Moss, B. S., *Supt.*
- Sandpoint—J. H. Christ, M. S., *Supt.*

ILLINOIS

College of Agriculture and the Agricultural Experiment Station of the University of Illinois, *Urbana*

*College faculty. †Station staff. ‡Extension staff

*David Kinley, Ph. D., LL. D., *President of University*

*†‡H. W. Mumford, B. S., D. Agr., *Dean Coll. of Agr., Dir. of Sta., Dir. of Agr. Ext. Service. Prof. An. Husb.*

†Anna C. Glover, *Secy. of Sta. and Mgr. of Pubs.*

Agronomy:
- *†W. L. Burlison, Ph. D., D. Agr., *Head of Dept. Prof. and Chief in Crop Prod.*
- †J. C. Anderson, B. S., *First Asst. in Soil. Fert.*
- †C. J. Badger, B. S., *Assoc. in Soil Expt. Fields.*
- †‡F. C. Bauer, Ph. D., *Prof. Soils Ext., Chief in Soil Expt. Fields.*
- †R. H. Bray, M. S., *First Asst. in Soil Survey Anal.*
- *†F. M. Clark, M. S., *Asst. in Soil Biol.*
- *†F. H. Crane, M. S., *Assoc. in Soil Fert.*
- *†E. E. De Turk, Ph. D., *Prof. and Chief in Soil Tech., in charge Soil Anal. of Soil Survey.*
- *†G. H. Dungan, Ph. D., *Asst. Prof. and Asst. Chief in Crop Prod.*
- †O. I. Ellis, B. S., *Asst. Chief in Soil Survey Mapping.*
- †J. E. Gieseking, M. S., *Asst. in Soil Expt. Fields.*
- †‡J. C. Hackleman, A. M., *Prof. and Chief in Crops Ext.*
- *†M. B. Harland, B. S., *Assoc. in Soil Phys.*
- †M. A. Heln, B. S., *Assoc. in Soil Expt. Fields.*
- †C. F. Hottes, Ph. D., *Consult. Plant Physiol.*
- †Benjamin Koehler, Ph. D., *Asst. Chief in Crop Path.*
- †‡John Lamb, jr., B. S., *Assoc. in Soil Expt. Fields and Soils Ext. (P. O., Newton).*
- †A. L. Lang, B. S., *Assoc. in Soil Expt. Fields (P. O., Dixon).*
- ‡C. M. Linsley, M. S., *Asst. Prof. Soils Ext.*
- †H. A. Lunt, M. S., *First Asst. in Soil Fert. and Soil Expt. Fields.*
- †J. E. McKittrick, M. S., *Asst. in Soil Expt. Fields.*

Agronomy—Continued.
- *R. L. Matlock, B. S., *Asst. in Crop Prod.*
- †D. C. Maxwell, B. S., *Asst. in Soil Survey Mapping.*
- †L. B. Miller, B. S., *Asst. in Soil Expt. Fields.*
- †E. A. Norton, B. S., *Asst. Chief in Soil Survey Mapping.*
- *†W. R. Paden, M. S., *Asst. in Soil Biol.*
- *†J. J. Pieper, Ph. D., *Asst. Prof. and Asst. Chief in Crop Prod.*
- *†L. F. Rickey, B. S., M. B. A., *Assoc. in Grain Mktg. Tech.*
- *†O. H. Sears, M. S., *Asst. Prof. and Asst. Chief in Soil Biol.*
- †E. G. Sievcking, A. M., *First Asst. in Soil Survey Anal.*
- †L. H. Smith, Ph. D., *Chief in charge Pubs. of Soil Survey.*
- *†R. S. Smith, Ph. D., *Prof. and Chief in Soil Phys., in charge Identification and Mapping of Soil Types.*
- ††H. J. Snider,[1] M. S., *Asst. Chief in Soil Expt. Fields. Soils Ext. Work.*
- †V. E. Spencer, M. S., *Assoc. in Soil Fert.*
- †R. W. Stark, M. S., *Assoc. in Crop Prod.*
- *†R. S. Stauffer, M. S., *Assoc. in Soil Phys.*
- †A. U. Thor, B. S., *First Asst. in Soil Expt. Fields.*
- *†Collins Ventch, M. S., *Asst. in Plant Brdg.*
- †F. M. Willhite, *Asst. in Soil Survey Anal.*
- *†D. C. Wimer, M. S., *Asst. Prof. and Asst. Chief in Soil Phys.*
- *†F. L. Winter, M. S., *Assoc. in Plant Brdg.*
- *†Eric Winters, jr., B. S., *Asst. in Soil Phys. and Soil Survey Mapping.*
- *†C. M. Woodworth, Ph. D., *Assoc. Prof. and Assoc. Chief in Plant Brdg.*

[1] On leave.

Animal Husbandry:

*†H. P. Rusk, M. S., *Head of Dept. Prof. and Chief in Beef Cattle Husb.*
‡H. H. Alp, *Poultry Specialist.*
*†R. C. Ashby, M. S., *Asst. Prof. and Asst. Chief in Livestock Mkty.*
†Jessie R. Beadles, B. S., *Asst. in An. Nutr.*
*†Sheeter Bull, M. S., *Assoc. Prof. An. Husb.; Assoc. Chief in Meats.*
*†L. E. Card, Ph. D., *Prof. and Chief in Poultry Husb.*
*†W. E. Carroll, Ph. D., *Prof. and Chief in Swine Husb.*
*†C. W. Crawford, B. S., *Assoc. in An. Husb.*
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*†H. S. Grindley, Sc. D., *Prof. and Assoc. Chief in An. Nutr.*
*†T. S. Hamilton, M. S., *Assoc. in An. Nutr.*
*†W. G. Kammlade, M. S., *Asst. Prof. and Asst. Chief in Sheep Husb.*
†Mary H. Kelth, M. A., *First. Asst. in An. Nutr.*
*†J. H. Knox, M. S., *Instr. and First Asst. in An. Husb.*
†F. J. McClure, M. S., *Asst. in An. Nutr.*
*†E. C. McCulloch, D. V. M., *Instr. and First Asst. in An. Husb.*
*†H. H. Mitchell, Ph. D., *Prof. and Chief in An. Nutr.*
†H. P. Morris, M. S., *Asst. in An. Nutr.*
*†F. C. Olson, M. S., *Instr. and First Asst. in An. Husb.*
‡E. T. Robbins, M. S., *Specialist in An. Husb.*
*†Elmer Roberts, Ph. D., *Assoc. Prof. and Assoc. Chief in An. Brdg.*
*†R. R. Snapp, M. S., *Assoc. Prof. An. Husb.; Assoc. Chief in Beef Cattle Husb.*
*†E. A. Tunnicliff, D. V. M., M. S., *Assoc. in An. Path.*

Dairy Husbandry:

*†H. A. Ruehe, Ph. D., *Head of Dept. Prof. and Chief in Dairy Mfrs.*
*†J. M. Brannon, Ph. D., *Asst. Prof. and Asst. Chief in Dairy Bact.*
‡J. H. Brock, B. S., *Asst. in Dairy Husb. Ext.*
†C. A. Brown, M. S., *Assoc. in Dairy Econ.*
*W. J. Fraser, M. S., *Prof. Dairy Farming.*
*†W. L. Gaines, Ph. D., *Prof. and Chief in Milk Prod.*

Dairy Husbandry—Continued.

*†A. F. Kuhlman, M. S., *Instr. and First Asst. Dairy Husb.*
*†W. B. Nevens, Ph. D., *Asst. Prof. and Asst. Chief in Dairy Cattle Feeding.*
*†O. R. Overman, Ph. D., *Asst. Prof. and Asst. Chief in Dairy Chem.*
*†M. J. Prucha, Ph. D., *Prof. and Chief in Dairy Bact.*
††C. S. Rhode, B. S., *Assoc. Prof. and Assoc. Chief in Dairy Husb. Ext.*
*†F. P. Sammann, M. S., *Assoc. in Dairy Mfrs.*
*†P. H. Tracy, M. S., *Asst. Prof. and Asst. Chief in Dairy Mfrs.*
*†K. E. Wright, M. S., *Asst. in Dairy Bact.*
*†W. W. Yapp, Ph. D., *Assoc. Prof. and Assoc. Chief in Dairy Cattle Husb.*

Economics (Agr.):

*†C. L. Stewart, Ph. D., *Assoc. Prof. and Chief in Agr. Econ.*[1]
*†L. J. Norton, Ph. D., *Asst. Prof. and Asst. Chief in Agr. Econ.*[1]
†O. L. Whalin, M. S., *Research Asst. in Agr. Econ.*

Editorial:

‡F. J. Keilholz, B. S., *Ext. Editor.*
†Blanche Penrod, A. B., *Editorial Asst.*
†Edna M. Walters, A. B., *Editorial Asst.*

Education (Agr.):[2]

*A. W. Nolan,[3] Ph. D., *Assoc. Prof. Agr. Ed.*
*Carl Colvin, M. S., *Actg. Assoc. Prof. Agr. Ed.*
*Florence M. King, M. S., *Instr. Home Econ. Ed.*
*B. C. Lawson, M. S., *Instr. Agr. Ed.*
*Anna B. Robinson, A. M., *Assoc. in Home Econ. Ed.*
*H. J. Rucker, B. S., *Instr. Agr. Ed.*
*L. L. Scranton, M. S., *Instr. Agr. Ed.*
*A. Elizabeth Todd, Ph. B., A. M., *Assoc. in Home Econ. Ed.*

Entomology:

*†W. P. Flint, B. S., *Consult. Ent.*

Extension (Coop.):[4]

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††W. H. Smith, M. S., *State Leader of Farm Advisers, Prof. and Chief in An. Husb. Ext.*
‡J. D. Bilsborrow, B. S., *Asst. State Leader of Farm Advisers.*
‡C. E. Gates, M. S., *Assoc. in Junior Club Work.*
‡E. I. Pilchard, B. S., *Specialist in Junior Club Work.*

[1] Courses given in College of Commerce.
[2] Courses given in College of Education.
[3] On leave.
[4] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

Extension (Coop.)—Continued.

‡J. C. Spitler, B. S., *Asst. State Leader of Farm Advisers.*

‡Margaret L. Utley, B. S., *Specialist in Office Organ. and Mgt.*

Extension (Coll.):

*‡F. H. Rankin, B. S., *Asst. Dean of Coll., Supt. of Agr. Coll. Ext.*

‡R. E. Hieronymus, A. M., LL. D., *Community Adviser.*

*W. H. Young, *Assoc. in Agr. Coll. Ext.*

Farm Mechanics:

*†E. W. Lehmann, E. E., A. E., *Head of Dept. Prof. and Chief in Farm Mech.*

*†‡I. P. Blauser, B. S., *Instr. and First Asst. in Farm Mech.*

*W. A. Foster, B. S., B. Arch., A. E., *Asst Prof. Rural Arch.*

*†‡G. F. Hoover, B. S., *Asst. in Farm Mech.*

*†R. C. Kelleher, B. S., C. E., *Instr. and First Asst. in Farm Mech.*

†F. C. Kingsley, B. S., *Asst. in Farm Mech.*

*†R. I. Shawl, M. S., *Asst. Prof. and Asst. Chief in Farm Mech.*

*†A. L. Young, M. S., *Assoc. in Farm Mech.*

Farm Organization and Management:

*†H. C. M. Case, M. S., *in charge of Dept. Assoc. Prof. and Assoc. Chief in Farm Organ. and Mgt.*

†J. B. Andrews, M. S., *Assoc. in Farm Organ. and Mgt.*

*†H. A. Berg, M. S., *Assoc. in Farm Organ. and Mgt.*

†J. D. Blisborrow, B. S., *Asst. in Farm Organ. and Mgt.*

‡†R. R. Hudelson, M. A., *Assoc. Prof. and Assoc. Chief in Farm Organ. and Mgt. Ext.*

*†P. E. Johnston, M. S., *Assoc. in Farm Organ. and Mgt.*

‡M. L. Mosher, B. S., *Asst. Prof. Farm Organ. and Mgt. Ext. (P. O., Eureka).*

†Peter Nelson, M. A., *Asst in Farm Organ. and Mgt.*

†Lena C. Rhue, B. S., *Asst. in Farm Organ. and Mgt.*

*†R. C. Ross, M. S., *Assoc. in Farm Organ. and Mgt.*

†R. G. Trummel, B. S., *Field Asst. in Farm Organ. and Mgt.*

†F. L. Underwood, B. S., *Field Asst. in Farm Organ and Mgt.*

Farm Organization and Management—Continued.

*†R. H. Wilcox, M. S., *Assoc. Prof. and Asst. Chief in Farm Organ. and Mgt.*

†K. T. Wright, B. S., *Field Asst. in Dairy Cost Accounting.*

Home Economics:

*‡Ruth A. Wardall, A. M., *Prof. and Head of Dept., Vice Dir. of Home Econ. Ext.*

*‡Kathryn G. Van Aken, M. A., *Asst. Prof. Home Econ. and State Leader in Home Econ. Ext.*

‡Grace B. Armstrong, M. A., *Asst. Prof. Foods and Nutr. Ext.*

*†Rossleene M. Arnold, Ph. D., *Asst. Prof. Nutr.*

*Irene M. Barnes, A. M., *Instr. Costume Design.*

*Harriet T. Barto, A. M., *Asst. Prof. Dietetics.*

*Katherine Bazore, A. M., *Instr. Home Econ.*

*‡Fannie M. Brooks, A. B., R. N., *Asst. Prof. Home Econ.*

*Margaret O. Brown, B. A., *Asst. in Institutional Mgt.*

*Evelyn C. Colburn, M. S., *Instr. Dietetics and Nutr.*

*Carlotta M. Ford, M. A., *Assoc. in Home Mgt.*

‡Mary Grady, B. S., *Specialist in Junior Club Work.*

†Edna R. Gray, B. S., *Assoc. in Clothing Ext.*

*Katherine B. Gunn, M. S., *Instr. Foods.*

*Edna A. Jacobsen, A. M., *Asst. Prof. Clothing.*

*Helen McCullough, M. A., *Assoc. in Textiles.*

‡Mary A. McKee, A. B., *Specialist in Junior Club Work.*

*Louise Millhouse, A. B., *Asst. in Foods.*

*Margaret L. Plant, M. S., *Instr. Nutr.*

*Clara M. Rocke, *Lab. Asst. in Nutr.*

*†Anna M. Schreiber, M. A., *Instr. Foods.*

*E. Evelyn Smith, M. A., *Asst. Prof. Institutional Mgt.*

*Deborah W. Solliday, B. S., *Lab. Asst. in Foods and Nutr.*

‡M. Attie Souder, B. S., *Assoc. in Home Mgt. Ext.*

*‡Edna E. Walls, Ph. B., M. A., *Asst. Prof. Child Care and Training.*

*Virginia H. Weaver, M. A., *Assoc. in Home Decoration.*

*Mary C. Whitlock, M. A., *Assoc. in Clothing.*

Horticulture:

*†J. C. Blair, Sc. D., *Head of Dept. Prof. and Chief in Hort.*
*†H. W. Anderson, Ph. D., *Assoc. Prof. and Assoc. Chief in Pomol. Path.*
*Harland Bartholomew, C. E., *Assoc. Prof. Civic Design.*
*†A. S. Colby, Ph. D., *Assoc. Prof. and Assoc. Chief in Pomol.*
*†S. W. Decker, B. S., *Instr. and Asst. in Flor.*
*†H. B. Dorner, M. S., *Prof. and Chief in Flor.*
*†M. J. Dorsey, Ph. D., *Prof. and Chief in Pomol.*
†M. C. Gillis, Ph. D., *Assoc. in Oler.*
*†S. W. Hall, B. S., *Asst. Prof. and Asst. Chief in Flor.*
*†W. A. Huelson, M. S., *Asst. Prof. and Asst. Chief in Oler.*
†James Hutchinson, *Assoc. in Flor.*
*†V. W. Kelley, M. S., *Assoc. in Pomol.*
†E. P. Lewis, M. S., *Assoc. in Oler. (P. O., Des Plaines).*
*†J. W. Lloyd, Ph. D., *Prof. and Chief in Olcr.*
*K. B. Lohmann,[1] M. L. A., *Assoc. Prof. Landsc. Arch.*

Horticulture—Continued.

*May E. McAdams, B. S., *Assoc. in Landsc. Arch.*
†R. L. McMunn, B. S., *First Asst. in Pomol.*
‡R. S. Marsh, Ph. D., *Asst. Prof. Hort. Ext.*
†H. M. Newell, B. S., *Asst. in Fruit and Veg. Mktg.*
*I. L. Peterson, B. S., *Assoc. in Landsc. Arch.*
*Florence B. Robinson, B. S., Ph. B., M. L. D., *Assoc. in Landsc. Arch.*
*†W. A. Ruth, Ph. D., *Prof. and Chief in Pomol. Physiol.*
*O. G. Schaffer, B. S., *Asst. Prof. Landsc. Arch.*
*†L. A. Somers, B. S., *Asst. in Oler.*
*†L. H. Strubinger, B. S., *First Asst. in Olcr.*
*‡B. L. Weaver, B. S., *Asst. in Olcr. and Veg. Gard. (Ext.).*
*†F. F. Weinard, Ph. D., *Asst. Prof. and Asst. Chief in Flor. Physiol.*
*S. H. White, B. S., M. L. A., *Assoc. Prof. Landsc. Arch.*

Miscellaneous:

*†Mary G. Burwash, A. B., B. L. S., *Libr.*

INDIANA

Purdue University (the School of Agriculture, the Agricultural Experiment Station, the School of Home Economics, and the Department of Agricultural Extension), *La Fayette*

*College faculty. †Station staff. ‡Extension staff

*E. C. Elliott, Ph. D., *President of University*
*†J. H. Skinner, B. S., *Dean School of Agr.*
*Mary L. Matthews, B. S., *Dean School of Home Economics*
††G. I. Christie, D. Sc., *Dir. of Sta., Dir. Dept. of Agr. Ext.*
†H. J. Reed, *Asst. Dir. of Sta., Farm Dir.*

Agronomy:

*††A. T. Wiancko, B. S., *Head of Dept. Prof. and Chief in Agron.*
*†G. H. Cutler, M. S., *Prof. and Asst. Chief in Agron.*
‡K. E. Beeson, M. S., *Asst. in Soils and Crops.*
*P. H. Brewer, A. B., *Instr. Agr. Chem.*
†T. M. Bushnell, B. S., *Assoc. in Soil Survey.*
*R. H. Carr, Ph. D., *Prof. Agr. Chem.*
†S. D. Conner, M. S., *Research Chem.*
*†M. L. Fisher, M. S., *Prof. Agron.; Assoc. in Crops.*
†D. R. Kunkel, B. S., *Asst. in Soil Survey.*
†S. R. Miles, B. S., *Research Asst. in Agron.*
†R. R. Mulvey, B. S., *Assoc. in Crops.*
‡M. O. Pence, M. S., *Assoc. in Soils and Crops.*

Agronomy—Continued.

*F. B. Robbins, M. S., *Assoc. Prof. Crop Prod.*
*J. P. Seaton, M. A., *Instr. Soils.*
†H. P. Ulrich, B. S., *Asst. in Soil Survey.*
†G. P. Walker, B. S., *Assoc. in Soils.*
*R. C. E. Wallace, B. S., *Prof. Soils.*

Animal Husbandry:

Dean Skinner, *Head of Dept.*
†F. G. King, B. S., *Assoc. Chief in An. Husb.*
‡P. T. Brown, B. S., *Asst. in An. Husb.*
*†R. B. Cooley, B. S., *Asst. Prof. An. Husb.; Secy. Stallion Enrollment Board.*
*V. C. Freeman, M. S., *Asst. in An. Husb. and Asst. to the Dean.*
*C. F. Gobble, M. Agr., *Assoc. Prof. An. Husb.*

[1] On leave.

Animal Husbandry—Continued.

‡Claude Harper, M. S., *Assoc. in An. Husb.*
*R. L. McCally, B. S., *Asst. Prof. An. Husb.*
*B. E. Pontius, Ph. D., *Asst. Prof. An. Husb.*
‡J. W. Schwab, B. S., *Assoc. in An. Husb.*
†E. L. Scott, M. S., *Asst. in An. Husb.*
*W. W. Smith, M. S., M. Agr., *Prof. An. Husb.*
†C. M. Vestal, B. S., *Assoc. in An. Husb.*
†J. R. Wiley, B. S., *Assoc. in An. Husb.*

Biology:

*H. E. Enders, Ph. D., *Head of Dept. Prof. Zool.*
*C. A. Behrens, Ph. D., *Prof. Bact.*
*D. W. Creel, B. S., *Instr. Bact.*
*K. L. Dickens, M. S., *Instr. Gen. Biol.*
*D. H. Dunham, M. S., *Instr. Gen. Biol.*
*Elizabeth O. Hassenzahl, M. S., *Instr. Gen. Biol.*
*C. M. James, M. S., *Asst. Prof. Anat. and Physiol.*
*C. H. Kelpper, B. S., *Asst. in Bact.*

Botany:

†H. S. Jackson, A. B., *Head of Dept. (Coop. U. S. D. A.).*
†L. E. Compton, B. S., *Asst. in Bot. (Coop. U. S. D. A.).*
*D. C. Cooper, M. S., *Instr. Bot.*
†M. W. Gardner, Ph. D., *Assoc. in Bot.*
‡C. T. Gregory, Ph. D., *Assoc. in Bot.*
††A. A. Hansen, M. S., *Assoc. in Bot.*
†G. N. Hoffer, D. Sc., *Assoc. Bot. and Path. (Coop. U. S. D. A.).*
*E. J. Kohl, M. S., *Asst. Prof. Bot.*
‡W. E. Leer, M. S., *State Leader of Barberry Erad. (Coop. U. S. D. A.).*
†E. B. Mains, Ph. D., *Assoc. in Bot. (Coop. U. S. D. A.).*
*C. L. Porter, Ph. D., *Assoc. Prof. Plant Path. and Physiol.*
†R. W. Samson, M. S., *Asst. Bot.*
†G. M. Smith, M. S., *Asst. Path. (Coop. U. S. D. A.).*
†R. R. St. John, M. S., *Asst. in Bot.*
†Dorothy M. Thompson, M. S., *Asst. in Bot.*
†J. P. Trost, M. S., *Asst. Path. in Bot. (Coop. U. S. D. A.).*
†R. A. Weaver, B. S. Ch. E., *Asst. in Bot. (Coop. U. S. D. A.).*

Chemistry (Agr.):

*R. B. Moore, D. Sc., *Head of Dept.*
*R. H. Carr, Ph. D., *Prof. Agr. Chem.*
†S. D. Conner, M. S., *Research Chem.*
*F. J. Allen, M. S., *Instr. Gen. Chem.*

Chemistry (Agr.)—Continued.

*P. H. Brewer, A. B., *Instr. Agr. Chem.*
*G. K. Foresman, M. S., *Instr. Org. Chem.*
†S. M. Hauge, Ph. D., *Research Assoc. in Biochem.*
*H. R. Kraybill, Ph. D., *Prof. Agr. Chem. (State Chem.).*
*F. D. Martin, M. S., *Instr. Agr. Chem.*
*M. G. Mellon, Ph. D., *Assoc. Prof. Anal. Chem.*
*R. E. Nelson, Ph. D., *Assoc. Prof. Org. Chem.*
*R. F. Newton, Ph. D., *Asst. Prof. Phys. Chem.*
*L. A. Test, Ph. D., *Prof. Gen. Chem.*

Dairy Husbandry:

*†H. W. Gregory, M. S., *Head of Dept.*
†T. H. Binney, M. S., *Assoc. Chief in charge Creamery License Div.*
*K. V. Bryan, M. S., *Asst. Prof. Dairying.*
†R. D. Canan, M. S., *Assoc. in Dairy Husb.*
†W. F. Epple, Ph. C., B. S., *Asst. Dairy Chem.*
‡E. A. Gannon, B. S., *Assoc. in Dairying.*
*‡J. H. Hilton, B. S., *Asst. Prof. Dairying.*
†V. C. Manhart, M. S., *Asst. in Dairy Mfrs.*
†H. O. Meyer, B. S., *Asst. in Dairy Husb.*
†L. D. Miller, B. S., *Asst. in Creamery Insp.*
*†E. H. Parfitt, M. S., *Asst. Prof. Dairy Bact.; Dairy Bact.*
†V. D. Rhodes, B. S., *Asst. in Creamery Insp.*
*Ralph E. Roberts, B. S., *Instr. Dairy Husb., Supt. of Creamery.*
†George Spitzer, Ph. G., B. S., *Assoc. in Dairy Chem.*
‡E. T. Wallace, B. S., *Asst. Dairy Husb.*
*†J. W. Wilbur, M. S., *Asst. Prof. and Asst. in Dairying.*
‡G. A. Williams, M. S., *Asst. in Dairy Husb.*

Economics—*See* **Farm Management.**

Education (Agr.):

*S. S. Cromer, B. S., *Prof. Agr. Ed.*
*J. R. Behr, B. S., *Asst. in Voc. Agr.*
*R. W. Gregory, M. S., *Instr. Voc. Agr. Teacher Training.*
*C. W. Hemmer, B. S., *Asst. in Voc. Agr.*
*S. B. Pershing, B. S., *Asst. in Voc. Agr.*

Engineering (Agr.):

•†William Aitkenhead, M. E., M. A., *Head of Dept.*
•C. C. Cunningham, B. S. C. E., *Asst. Prof. Agr. Engin.*
•R. B. Goss, *Instr. Agr. Engin.*
†T. E. Hienton, B. S., A. E., *Asst. in Agr. Engin.*
‡G. O. Hill, B. S., *Asst. Agr. Engin.*
•F. C. Lewis, A. E., *Asst. Prof. Agr. Engin.*
†I. D. Mayer, B. S. C. E., *Asst. in Agr. Engin.*
†R. H. Willeman, B. S., *Asst. Agr. Engin.*

Entomology:

•†J. J. Davis, B. S., *Head of Dept.*
†H. G. Butler, B. S., *Asst. Ent.*
†G. A. Ficht, M. A., *Asst. in Ent.*
†G. C. Oderkirk, B. S., *Rodent Control Work (Coop. U. S. D. A.).*
•W. A. Price, M. S., *Assoc. Prof. Ent.*
†H. K. Riley, B. S., *Asst. Ent.*
†L. F. Steiner, M. S., *Asst. Ent.*
•James Troop, M. S., *Prof. Ent.*

Extension (Admin.):[1]

Director Christie *in charge.*
‡T. A. Coleman, *Asst. Dir. and County Agt. Leader.*
‡Lella R. Gaddis, *State Home Dem. Leader.*
‡Z. M. Smith, A. M., *State Club Leader.*
‡H. F. Ainsworth, B. S., *Asst. Boys' and Girls' Clubs.*
‡W. Q. Fitch, B. S., *State Leader of Farmers' Insts.*
‡G. M. Frier, B. S., *Assoc. in charge Short Courses and Exhibits.*
‡W. F. Graham, B. S., *Asst. in Short Courses and Exhibits.*
‡Mabel L. Harlan, *Admin. Asst.*
‡L. E. Hoffman, B. S., *Asst. County Agt. Leader.*
‡T. R. Johnston, *Asst. County Agt. Leader and in charge Informational Service.*
‡W. V. Kell, *Asst. County Agt. Leader.*
•‡W. C. Latta, M. S., *Prof. and Consult. Specialist in Agr.*
‡Meta E. Martin, B. S., *Asst. State Home Dem. Leader.*
‡May A. Masten, B. S., *Asst. State Club Leader.*
‡F. M. Shanklin, A. M., *Asst. Boys' and Girls' Clubs.*
†W. A. Smith, M. S., *Asst. Boys' and Girls' Clubs.*
‡Neva M. Stephenson, B. S., *Asst. Boys' and Girls' Clubs.*

Farm Management and Rural Economics:

•†O. G. Lloyd, M. S., *Head Dept. of Farm Mgt.*
•‡O. F. Hall, A. B., S. T. B., *Assoc. in Rural Life Studies.*
†L. G. Hobson, B. S., *Asst. in Farm Mgt.*
†M. H. Overton, B. S., *Assoc. in Farm Mgt.*
•W. E. Paulson, Ph. D., *Asst. Prof. Farm Mgt. and Rural Econ.*
‡L. S. Robertson, B. S., *State Leader in Farm Mgt. Dem.*
•†E. C. Young, Ph. D., *Assoc. Prof. Farm Mgt. and Rural Econ.; Asst. in Farm Mgt.*
•†G. E. Young, M. S., *Assoc. Prof. Farm Mgt. and Rural Econ.; Asst. in Farm Mgt.*

Forestry:

•†B. N. Prentice, B. A., M. F., *Head of Dept.*
•F. F. Franklin, M. S., *Instr. For.*

Home Economics:[2]

•Mary L. Matthews, B. S., *Dean.*
•Amy I. Bloye, Ph. B., *Head Dept. of Foods and Nutr.*
•M. Edith Gamble, M. A., *Head Dept. of Institution Mgt.*
•Amy Howe, Ph. B., *Head Dept. of Textiles and Clothing.*
•Edith Palmer, B. S., *Head Dept. of Applied Art.*
•Emma A. Bale, A. M., *Assoc. Prof. Home Econ. Ed.*
‡Aneta P. Beadle, B. S., *Asst. in Home Econ.*
•Mrs. Mildred T. Beisel, B. S., *Instr. Foods.*
•Margaret A. Bennett, B. S., *Asst. in Home Admin.*
•Helen J. Bosard, A. M., *Asst. in Voc. Home Econ.*
•Rose M. Darst, M. A., *Asst. in Applied Design.*
‡Nelle K. Flaningham, *Asst. in Home Econ.*
•L. Margaret Johnson, B. A., *Asst. in Foods and Nutr.*
†Ruth Jordan, B. S., *Asst. in Home Econ.*
•Anita E. Kuehn, M. S., *Instr. Textiles and Clothing.*
•Hazel M. Landin, M. A., *Asst. Prof. Household Admin.*
•Mary B. Lawton, M. S., *Instr. Foods.*
•Olena R. McCain, B. S., *Asst. in Clothing and Textiles.*
‡Kathryne L. McMahon, B. S., *Asst. in Home Econ.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

[2] Given in School of Science.

Home Economics—Continued.
- •Marguerite G. Mallon, Ph. D., *Asst. Prof. Nutr.*
- ‡Flora E. Miller, B. S., *Asst. in Home Econ.*
- ‡Gertrude Owen, A. M., *Asst. in Home Econ.*
- •Philena F. Palmer, M. S., *Instr. Clothing.*
- •Laura A. Partch, B. S., R. N., *Asst. Prof. Child Care and Home Nursing.*
- †Miriam Rapp, M. S., *Research Asst. in Home Econ.*
- •Ruth R. Van Huss, B. S., *Asst. in Institution Mgt.*
- •Marian E. Willoughby, M. A., *Instr. Clothing.*

Horticulture:
- •†Laurenz Greene,[1] M. S., *Head of Dept.*
- •O. G. Anderson, B. S., *Prof. Hort.*
- †C. E. Baker, B. S., *Asst. in Pomol.*
- •†H. D. Brown, Ph. D., *Assoc. Prof. and Research Assoc. in Veg. Gard.*
- ††C. L. Burkholder, B. S., *Asst. Chief and Assoc. in Hort. Ext.*
- †H. M. Cleaver, B. S., *Asst. in Hort.*
- †F. P. Cullinan, B. S., *Research Assoc. in Pomol.*
- †F. C. Gaylord, B. S., *Assoc. in Hort.*
- †E. S. Haddad, M. S., *Research Asst. in Hort.*
- •E. R. Honeywell, M. S., *Asst. Prof. Flor.*
- ‡E. R. Lancashire, M. S., *Asst. in Hort.*
- •W. E. Lommel, B. S., *Assoc. Prof. Hort.*
- ‡Monroe McCown, B. S., *Asst. in Hort.*
- †J. H. MacGillivray, Ph. D., *Research Asst. in Hort.*
- •E. C. Stair, M. S., *Instr. Hort.*
- †A. H. Watson, B. S., *Research Asst. in Hort.*

Physics:
- •E. S. Ferry, B. S., *Head of Dept.*
- •Elizabeth A. Mitchell, A. M., *Instr. Phys.*

Poultry Husbandry:
- •††C. W. Carrick, M. S., *Head of Dept.*
- •†F. D. Brooks, B. S., *Asst. Prof. and Asst. in Poultry Husb.*
- ‡P. H. Gooding, M. S., *Asst. in Poultry Husb.*
- †E. R. Menefee, M. S., *Research in Poultry Mktg.*
- †R. W. Prange, B. S., *Asst. Poultry Husb.*
- †Roy E. Roberts, M. S., *Assoc. in Poultry Husb.*
- ‡Martine A. Seaton, B. S., *Asst. in Poultry Husb.*
- •†L. H. Schwartz, B. S., *Assoc. Prof. and Asst. Poultry Husb.*

Regulatory (State Chem. and Seed Work):
- †H. R. Kraybill, Ph. D., *State Chem. and Seed Comr.*
- †O. S. Roberts, B. S., *Chief Insp.*
- †R. O. Bitler, B. S., *Deputy State Chem.*
- †C. R. Breden, B. S., *Asst. Chem.*
- †C. M. Cohee, *Insp. State Chem. Dept.*
- †P. B. Curtis, B. S., *Deputy State Chem.*
- †O. W. Ford, A. B., *Deputy State Chem.*
- †R. F. Hine, B. S. Ch. E., *Deputy State Chem.*
- †L. E. Horst, B. S. Ch. E., *Deputy State Chem.*
- †L. P. Miller, M. S., *Insp. State Chem. Dept.*
- †L. W. Moore, B. S., *Insp. State Chem. Dept.*
- †Edith M. Patt, *Seed Analyst.*
- †Regina B. Schulte, A. B., *Sci. Asst. in Agr. Seed Control*
- †J. T. Sullivan, M. S., *Asst. Chem. State Chem. Dept.*
- †M. H. Thornton, B. S., *Deputy State Chem.*
- †S. F. Thornton, B. S., *Asst. Chem*
- †C. C. Yund, B. S., *Asst. Chem.*

Statistics (Agr.):
- †M. M. Justin, M. S., *Agr. Statistician in charge.*
- †C. J. Borum, M. S., *Asst. Junior Agr. Statistician.*

Veterinary Science:
- •†R. A. Craig, D. V. M., *Head of Dept.*
- †L. P. Doyle, M. S., *Assoc. An. Path.*
- †F. P. Mathews, B. S., D. V. M., *Asst. in Vet. Sci.*
- •†G. H. Roberts, V. S., V. M. D., *Assoc. Prof. and Assoc. in Vet. Sci.*
- †F. L. Walkey, D. V. M., *Asst. An. Path.*
- •†R. A. Whiting, D. V. M., *Instr. Vet. Sci.; Assoc. in An. Path*

Miscellaneous:
- ††J. C. Allen, *Photog.*
- •W. M. Hepburn, M. A., B. L. S., *Libr.*
- •W. O. Mills, B. S., *Field Man.*
- •†F. S. Purnell, LL. B., *Lect. on Agr. Legislation (nonresident).*
- †I. Elizabeth Sempill, *Asst. Libr.*

Substations:
- Herbert Davis Forestry Farm, *P. O., Farmland*—L. E. Hampton, *Supt.*
- Moses Fell Annex, *P. O., Bedford*—E. W. Moore, *Supt.*
- Pinney-Purdue Farm, *P. O., Wanatah*, ——— ———, *Supt.*
- Purdue Vincennes Expt. Stn., *P. O., Vincennes*—Arthur Goss, M. S., *Supt.*

[1] On leave.

IOWA

Iowa State College of Agriculture and Mechanic Arts and the Agricultural Experiment Station, *Ames*

*College faculty. †Station staff. ‡Extension staff

*R. M. Hughes, M. S., *President*
*†C. F. Curtiss, D. Sc., *Dean Div. of Agr. Dir. of Sta.*
‡R. K. Bliss, B. S., *Dir. of Agr. Ext.*

Animal Husbandry:

*†H. H. Kildee, M. S., *Head of Dept., Vice Dean Div. of Agr.; Chief An. Husb.*
*†Earl Weaver, M. S., *Prof. and Chief in Dairy Husb.*
*†H. A. Bittenbender, B. S., *Prof. and Chief in Poultry Husb.*
*A. L. Anderson, M. S., *Assoc. Prof. An. Husb.*
‡F. J. Arnold, B. S., *Ext. Asst. in Dairy Prod.*
†C. F. Bassett, M. S., *Supt. An. Husb. Expts.*
‡Rex Beresford, B. S., *Ext. Prof. An. Husb.*
*C. A. Burge, M. S., *Instr. An. Husb.*
*†A. B. Caine, M. S., *Assoc. Prof. An. Husb.; Chief in Horse Invest.*
*†R. L. Cochran, M. S., *Asst. Prof. and Asst. Chief in Poultry Husb.*
†C. C. Culbertson, M. S., *Asst. Chief in An. Husb.*
*†C. C. Davis, B. S., *Dairy Farm Foreman.*
*†Fordyce Ely, M. S., *Assoc. Prof. and Asst. Chief in Dairy Husb.*
*†John M. Evvard, Ph. D., *Prof. An. Husb.; Chief in Swine, Sheep, and Beef Cattle Prod.*
*J. G. Hammer, *Farm Supt.*
†W. E. Hammond, M. S., *Asst. in An. Husb.*
*†M. D. Helser, M. S., *Prof. An. Husb.; Chief in Meat Invest.*
*J. C. Holbert, M. S., *Instr. An. Husb.*
*†M. L. Jones, *Supt. Poultry Farm.*
*†C. W. Knox, Ph. D., *Instr. and Asst. Poultry Husb.*
*W. F. LaGrange, B. S., *Prof. An. Husb.*
‡C. W. McDonald, M. S., *Ext. Assoc. Prof. An. Husb.*
*†C. A. Matthews, M. S., *Instr. and Asst. in Dairy Husb.*
‡B. S. Oderkirk, M. S., *Ext. Assoc. Prof. Dairy Prod.*
‡E. L. Qualfe, B. S., *Ext. Assoc. Prof. An. Husb.*
‡E. J. Rood, *Ext. Asst. in Poultry Husb.*
†J. A. Schulz, M. S., *Asst. Chief in Nutr.*
*†P. S. Shearer, B. S., *Prof. An. Husb.; Chief in An. Brdg. Invest.*

Animal Husbandry—Continued.

‡E. N. Shultz, *Ext. Asst. in Dairy Prod.*
‡R. W. Snyder, M. S., *Ext. Asst. Prof. An. Husb.*
§R. S. Stephenson, M. S., *Assoc. Prof. An. Husb.*
‡R. L. Watkins, B. S., *Ext. Asst. Poultry Husb.*

Bacteriology:

*†R. E. Buchanan, Ph. D., *Head of Dept. and Dean of Grad. Coll.; Chief Bact.*
*Max Levine, Ph. D., *Prof. Bact.*
*C. S. McCleskey, M. S., *Instr. Bact.*
*†C. H. Werkman, Ph. D., *Assoc. Prof. and Asst. Chief Bact.*

Botany and Plant Pathology:

*†L. H. Pammel, Ph. D., D. Sc., *Head of Dept.; Chief Bot.*
*†I. E. Melhus, Ph. D., *Prof. and Chief in Plant Path.*
*†A. L. Bakke, Ph. D., *Prof. and Chief in Plant Physiol.*
*J. M. Aikman, M. A., *Asst. Prof. Bot.*
†Donald Bliss, M. S., *Asst. Plant Path.*
†R. C. Brockman, *Field Asst. in Plant Path.*
*E. F. Castetter, Ph. D., *Assoc. Prof. Bot.*
*R. I. Cratty, *Curator.*
*S. M. Dietz, Ph. D., *Asst. Prof. Plant Path.*
*J. C. Gilman, Ph. D., *Assoc. Prof. Plant Path.*
*Ada Hayden, Ph. D., *Asst. Prof. Bot.*
†Charlotte M. King, *Asst. Chief Bot.*
†Duke Layton, B. S., *Asst. Plant Path.*
*W. E. Loomis, Ph. D., *Assoc. Prof. Plant Physiol.*
*†J. N. Martin, Ph. D., *Prof. Plant Morphology and Cytology; Asst. Bot.*
*J. H. Muncie, Ph. D., *Asst. Prof. Plant Path. (Coop. U. S. D. A.).*
†D. R. Porter, M. S., *Asst. Plant Path.*
‡R. H. Porter, M. S., *Ext. Assoc. Prof. Plant Path.*
*†C. S. Reddy, Ph. D., *Asst. Prof. and Asst. Plant Path.*
*R. G. Reeves, M. S., *Instr. Bot.*
†J. A. Trumbower, M. S., *Asst. Plant Path.*

Chemistry:

•†W. F. Coover, A. M., *Head of Dept.*
†W. G. Gaessler, M. S., *Actg. Chief Chem.*
•E. W. Bird, B. S., *Asst. Prof. Chem.*
•F. E. Brown, Ph. D., *Prof. Gen. and Inorg. Chem.*
•J. H. Buchanan, M. S., *Assoc. Prof. Food and Sanitary Chem.*
•O. W. Chapman, Ph. D., *Asst. Prof. Dairy Chem.*
•N. A. Clark, Ph. D., *Assoc. Prof. Soils Chem.*
•Rachel H. Edgar, Ph. D., *Asst. Prof. Chem.*
•H. E. Flanders, M. S., *Instr. Chem.*
•E. I. Fulmer, Ph. D., *Prof. Biophys. Chem.*
†Fisk Gerhardt, M. S., *Asst. Chem.*
•Henry Gilman, Ph. D., *Prof. Org. Chem.*
•S. A. Harris, M. S., *Instr. Chem.*
•Anson Hayes, Ph. D., *Prof. Phys. Chem.*
•R. M. Hixon, Ph. D., *Prof. Plant Chem.*
•I. B. Johns, jr., B. S., *Instr. Chem.*
•†R. L. Jones, M. S., *Chem. Tech.*
•W. B. King, M. S., *Instr. Chem.*
•O. E. Lowman, M. A., *Asst. Chem.*
•Nellie M. Naylor, Ph. D., *Asst. Prof. Inorg. Chem.*
•V. E. Nelson, M. S., *Prof. Physiol. and Nutr. Chem.*
•J. D. Robinson, B. S., *Instr. Chem.*
†J. A. Schulz, M. S., *Asst. Chem.*
•J. B. Shinmaker, M. S., *Instr. Chem.*
•H. O. Smith, M. S., *Instr. Chem.*
•C. C. Vernon, M. S., *Instr. Chem.*
•Anella M. Welben, M. S., *Instr. Chem.*
•J. A. Wilkinson, Ph. D., *Prof. Inorg. and Anal. Chem.*
†Lester Yoder, M. S., *Asst. Chem.*

Dairying:

•†Martin Mortensen, B. S., *Head of Dept.; Chief in Dairying.*
•†B. W. Hammer, Ph. D., *Prof. and Chief in Dairy Bact.*
•M. P. Baker, M. S., *Asst. Prof. Dairying.*
‡R. A. Bartlett, B. S., *Ext. Instr. Dairying.*
•J. E. Fensternacker, B. S., *Instr Dairying.*
•E. P. Goss, M. S., *Assoc. Prof. Dairying.*
•F. C. Hinze, *Instr. Dairying.*
†R. V. Hussong, M. S., *Asst. in Dairying.*
•C. A. Iverson, M. S., *Assoc. Prof. Dairying.*
•‡E. E. Kelley, B. S., *Instr. and Ext. Asst. in Dairying.*
•R. B. Locke, M. S., *Instr. Dairying.*

Dairying—Continued.

‡A. W. Rudnick, B. S., *Ext. Prof. Dairying.*
‡R. O. Storvick, B. S., *Ext. Instr. Dairying.*

Economics (Agr.):

•†C. L. Holmes, Ph. D., *Head of Dept.; Chief of Agr. Econ. Sec.*
•†P. L. Miller, M. A., *Prof. Agr. Econ.; Asst. Chief of Agr. Econ. Sec.*
†L. G. Allbaugh, B. S., *Ext. Asst. Prof. Farm Mgt.*
‡G. A. Arnold, *Ext. Asst. Prof. Agr. Econ.*
‡I. W. Arthur, *Ext. Asst. Prof. Mktg.*
•†Knute Bjorka, M. S., *Asst. Prof. and Asst. in Agr. Econ. and Farm Mgt.*
‡E. L. Cady, M. S., *Ext. Asst. Prof. Mktg.*
†D. A. FitzGerald, M. S., *Asst. in Agr. Econ.*
‡J. C. Galloway, B. S., *Farm Mgt. Dem.*
‡E. W. Gaumnitz, Ph. D., *Ext. Asst. Prof. Mktg.*
•W. L. Harter, M. S., *Assoc. Prof. Agr. Econ. and Farm Mgt.*
†C. E. Herriot, B. S., *Asst. in Agr. Econ.*
†J. P. Himmel, B. S., *Asst. in Agr. Econ.*
•†J. A. Hopkins, jr., Ph. D., *Assoc. Prof. and Asst. in Agr. Econ.*
†E. B. Hurd, M. S., *Research Asst. in Agr. Econ.*
•†A. H. Lindsey, M. S., *Asst. Prof. and Asst. in Agr. Econ.*
†A. T. Mighell, M. S., *Asst in Agr. Econ.*
•†W. G. Murray, M. A., *Asst. Prof. and Asst. in Agr. Econ.*
††Frank Robotka, M. S., *Ext. Assoc. Prof. and Asst. in Agr. Econ.*
•†G. S. Shepherd, M. S., *Asst. Prof. and Asst. in Agr. Econ.*
‡W. H. Stacy, M. S., *Ext. Assoc. Prof. Rural Organ.*
†R. E. Stewart, A. M., *Research Asst. in Rural Sociol.*
††W. D. Termohlen, B. S., *Ext. Asst. Prof. and Asst. Agr. Econ. (Mktg.).*
‡S. H. Thompson, M. S., *Ext. Prof. Agr. Econ.*
•†G. H. Von Tungeln, Ph. D., *Prof. and Chief in Rural Sociol.*

Editorial—*See* **Journalism.**

Education (Voc.-Agr.):

•W. H. Lancelot, B. S., *Head of Dept.*
•P. I. Barker, B. S., *Asst. Prof. Voc. Ed.*
•H. M. Byram, B. S., *Instr Voc. Ed.*

Education (Voc.-Agr.)—Continued.
- *W. F. Cramer, M. S., *Asst. Prof. Voc. Ed.*
- *H. M. Hamlin, M. S., *Assoc. Prof. Voc. Ed.*
- *Barton Morgan, M. S., *Asst. Prof. Voc. Ed.*
- *A. A. Suther, B. S., *Instr. Voc. Ed.*
- *J. A. Starrak, M. S., *Assoc. Prof. Voc. Ed.*
- *H. B. Swanson, M. S., *Asst. Prof. Voc. Ed.*

Engineering (Agr.):
- *†J. B. Davidson, B. S. M. E., A. E., *Head of Dept.; Chief of Agr. Engin. Sect.*
- *Q. C. Ayres, B. S., C. E., *Assoc. Prof. Agr. Engin.*
- A. W. Clyde, B. S. A. E., *Ext. Prof. Agr. Engin.*
- †E. V. Collins, B. S. A. E., *Asst. Chief Agr. Engin. Sect.*
- *F. C. Fenton, B. S. A. E., *Assoc. Prof. Agr. Engin.*
- †Henry Giese, M. S., *Asst. in Agr. Engin.*
- *E. G. Johnson, M. S., A. E., *Instr. Agr. Engin.*
- *E. M. Mervine, M. E., *Prof. Agr. Engin.*
- *M. A. Sharp, B. S., *Asst. Prof. Agr. Engin.*

Entomology—*See* **Zoology.**

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- *†P. E. Brown, Ph. D., *Prof. Soils; Chief Soil Chem. and Bact. Assoc. Dir. of Soil Survey.*
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- †T. H. Benton, M. S., *Soil Surveyor.*
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- *C. S. Dorchester, M. S., *Asst. Prof Farm Crops and Soils.*
- ‡E. S. Dyas, *Ext. Asst. Prof. Farm Crops and Soils.*
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- †H. R. Meldrum, B. S., *Asst. in Field Expts.*
- †A. M. O'Neal, B. S., *Soil Surveyor.*
- †C. L. Orrben, B. S., *Soil Surveyor.*
- †J. L. Robinson, M. S., *Supt. Coop. Expts.*
- *†F. B. Smith, Ph. D., *Asst. Prof. Soils; Asst. Chief in Soil Chem. and Bact.*
- *R. M. Vifquain, M. A., *Assoc. Prof. Farm Crops and Soils.*[2]
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- †F. S. Wilkins, M. S., *Asst. Chief in Farm Crops.*

Genetics:
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- *†M. R. Irwin, M. S., *Instr. and Asst. in Genetics.*
- *†W. V. Lambert, M. S., *Actg. Assoc. Prof. and Actg. Head of Dept.*

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[1] For subject-matter workers see the respective division, i. e., animal husbandry, bacteriology, etc.

[2] Noncollegiate.

[3] On leave.

Home Economics:

- *†Genevieve Fisher, M. A., *Dean of Div.; Chief in Home Econ.*
- *Joanna M. Hansen, M. A., *Prof. and Head Applied Art Work.*
- *Cora B. Miller, M. A., *Prof. and Head Voc. Ed. Home Econ.*
- *†P. Mabel Nelson, Ph. D., *Prof. and Head Foods and Nutr.; Asst. Chief in Home Econ.*
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- †Helen Barnard, *Foods and Nutr. Specialist.*
- †Eleanor Baur, B. S., *Home Furnishing Specialist.*
- *Viola M. Bell, M. A., *Assoc. Prof. Foods and Nutr.*
- *Lela J. Bennet, M. S., *Instr. Foods and Nutr.*
- *Helen A. Bishop, M. A., *Asst. Prof. Household Admin.*
- ‡Hazel I. Bown, B. S., *Clothing Specialist.*
- *Iva L. Brandt, M. S., *Prof. Textiles and Clothing.*
- *Vivian J. Brashear, B. S., *Instr. Household Admin.*
- *Harriet C. Brigham, M. S., *Instr. Household Admin.*
- *Mrs. Linda S. Brown, M. A., *Assoc. Prof. Institutional Admin.*
- ‡Ruth B. Cessna, M. A., *Foods and Nutr. Specialist.*
- ‡Lloyd V. Church, B. S., *Foods and Nutr. Specialist.*
- *†Mary C. Coit, A. M., *Instr. Econ.; Asst. in Household Admin.*
- ‡Harriet B. Cookingham, *Home Mgt. Specialist.*
- *Katherine T. Cranor, A. M., *Prof. Textiles and Clothing.*
- *Pauline H. Drollinger, M. S., *Instr. Voc. Ed. Home Econ.*
- ‡Mildred Elder, B. S., *Clothing Specialist.*
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- *Maud Fetherston, A. B., *Instr. Textiles and Clothing.*
- *Mabel C. Fisher, *Assoc. Prof. Applied Art.*
- *Regina J. Friant, Ph. B., M. A., *Assoc. Prof. Voc. Ed. Home Econ.*
- *Mary L. Gabrielson, M. A., *Instr. Textiles and Clothing.*
- ‡Fannie Gannon, *Home Mgt. Specialist.*
- *Medora Grandprey, B. S., *Instr. Household Admin.*
- ‡Mrs. Mary Gregg, *Asst. in Home Project Work.*
- *Margaret H. Haggart, M. A., *Asst. Prof. Foods and Nutr.*
- *Anna M. Henderson, *Asst. Prof. Applied Art.*

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- †Margaret C. House, M. S., *Asst. in Foods and Nutr.*
- *†Elizabeth E. Hoyt, Ph. D., *Prof. Econ. and Assoc. Prof. Household Admin.; Asst. in Household Admin.*
- *M. Orinne Johnson, B. S., *Instr. Homemakers' Unit Courses.*
- ‡Mrs. Alma H. Jones, M. S., *Specialist in Child Care and Parent Ed.*
- ‡Ruby Kassel, B. A., *Clothing Specialist.*
- *Emma G. Klitt, *Instr. Applied Art.*
- ‡Neale S. Knowles, *Ext. Prof. in charge Home Econ.*
- *Mrs. Lulu R. Lancaster,[1] B. S., *Assoc. Prof. Household Admin.*
- *Marion Lepley, B. S., *Instr. Applied Art.*
- *Belle Lowe, Ph. B., *Assoc. Prof. Foods and Nutr.*
- *†Laura I. McLaughlin, Ph. D., *Assoc. Prof. and Dir. Research in Foods and Nutr.*
- *Keo A. Minert, M. S., *Instr. Institutional Admin.*
- *Eva F. Montgomery, M. A., *Instr. Foods and Nutr.*
- *Mrs. Henry Ness, *Instr. Homemakers' Unit Courses.*
- *Edna O'Bryan, *Asst. Prof. Applied Art.*
- *Mrs. Alma R. Plagge, B. S., *Asst. Prof. Foods and Nutr.*
- ‡Esther Pond, B. S., *Clothing Specialist.*
- *Dorothy Proctor, M. S., *Instr. Voc. Ed. in Home Econ.*
- *Edna Rhoads, B. S., *Instr. Applied Art.*
- *Mrs. Marie P. Ringle, B. S., *Instr. Voc. Ed. in Home Econ.*
- ‡Marie Roberts, B. S., *Clothing Specialist.*
- *Mabel Russell, Ph. B., *Asst. Prof. Applied Art.*
- *Olive Settles, B. S., *Assoc. Prof. Textiles and Clothing.*
- *Ida M. Shilling, M. S., *Asst. Prof. Foods and Nutr.*
- ‡Allie M. Smith, M. S., *Clothing Specialist.*
- *Marie Stephens, B. S., *Assoc. Prof. Textiles and Clothing.*
- *Marguerite M. Stotts, A. B., *Instr. Applied Art.*
- ‡Lillie Swanson, B. S., *Foods and Nutr. Specialist.*
- *Lydia Swanson, B. S., *Asst. Prof. Household Admin.*
- ‡Avis Talcott, B. S., *Ext. Asst. Prof. in charge Home Econ.*

[1] On leave.

Home Economics—Continued.

*Marcia E. Turner, M. A., *Assoc. Prof Voc. Ed. in Home Econ*
*T. F. Vance, Ph. D., *Prof. Household Admin.*
*Alice Waugh, B. S., *Instr. Applied Art*
*Elsie P. Wilson, B. S., *Instr. Voc. Ed. in Home Econ*
L. Mildred Wilson, B. S., *Home Furnishing Specialist.*
Nora Workman, B. S., *Home Furnishing Specialist.*
†Adeline Wurdeman, B. S., *Home Furnishing Specialist.*

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*‡G. B. MacDonald, B. S., M. F., *Prof. and Chief in For.*
*†P. H. Elwood, jr., B. S., *Prof. and Chief in Landsc. Arch.*
†A. T. Erwin, M. S., *Chief in Veg. Crops.*
†T. J. Maney, B. S., *Chief in Pomol.*
‡I. T. Bode, M. S., *Ext. Assoc. Prof. For.*
*Perkins Coville, B. S., M. F., *Instr. For.*
*J. C. Cunningham, B. S., *Prof. Hort. and Supvr. of Voc. Agr. Courses.*
‡C. L. Fitch, M. A., *Ext. Prof. Veg. Crops.*
‡J. R. Fitzsimmons, M. L. A., M. S., *Ext. Assoc. Prof. Landsc. Arch.*
†E. S. Haber, M. S., *Asst. Chief in Veg. Crops.*
‡C. V. Holsinger, B. S., *Ext. Prof. Hort.*
*D. S. Jeffers, M. F., *Assoc. Prof. For.*
*H. F. Kenney, B. S. L. A., *Asst. Prof. Landsc. Arch.*
†H. L. Lantz, M. S., *Asst. Chief in Pomol.*
*J. A. Larsen, B. A., M. F., *Asst. Prof. For.*
‡H. E. Nichols, B. S., *Ext. Asst. Prof. Hort.*
†H. H. Plagge, M. S., *Asst. Pomol.*
*H. W. Richey, B. S., *Prof. Pomol.*
*R. R. Rothacker, M. S., *Asst. Prof. Landsc. Arch.*
*J. C. Schilletter, M. S., *Instr. Hort.*
*E. C. Volz, M. S., *Prof. Flor. and Veg. Crops.*
*W. B. Ward, B. S., *Asst. Prof. Hort.*

Journalism (Tech.):

*‡Blair Converse, A. M., *Head of Dept.; Bul. Editor.*
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†T. Gildersleeve, *Asst. Bul. Editor.*

Journalism (Tech.)—Continued.

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*R. E. Winfrey, M. S., *Instr. Tech. Journalism.*

Physics:

*L. B. Spinney, B. M. E., B. S. E. E., *Head of Dept.*
*A. A. Aardal, M. S., *Instr. Phys.*
*A. A. Benedict, A. M., *Asst. Prof. Phys.*
*L. W. Butler, A. B., *Asst. Prof. Phys.*
*L. V. Crum, M. S., *Instr. Phys.*
*G. E. Davis, M. S., *Asst. Prof. Phys.*
*William Kunerth, Ph. D., *Assoc. Prof. Phys.*
*E. C. McCracken, B. S., *Instr. Phys.*
*R. D. Miller, B. S., *Instr. Phys.*
*H. J. Plagge, M. A., *Assoc. Prof. Phys.*
*Harold Stiles, Ph. D., *Assoc. Prof. Phys.*
*G. E. Thompson, Ph. D., *Assoc. Prof. Phys.*
*L. H. Willson, B. S., *Asst. Prof. Phys.*
*J. W. Woodrow, Ph. D., *Prof. Phys.*

Veterinary Medicine:

*†C. H. Stange, D. V. M., *Dean of Div. and Dir. Vet. Invest.*
*E. A. Benbrook, V. M. D., *Prof. and Head Vet. Path. Dept.*
*H. D. Bergman, D. V. M., *Prof. and Head Vet. Physiol. and Pharmacol. Dept.*
*H. L. Foust, D. V. M., *Prof. and Head Vet. Anat. Dept.*
*W. F. Guard, D. V. M., *Prof. and Head Vet. Surg. Dept.*
*Charles Murray, D. V. M., Ph. B., B. S., *Prof. and Head Vet. Invest. Dept.*
*W. A. Aitken, D. V. M., *Assoc. Prof. Vet. Surg.*
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‡K. W. Stouder, D. V. M., *Ext. Prof. Vet. Med.*
*F. E. Walsh, D. V. M., *Asst. Prof. Vet. Med.*

Zoology and Entomology:

•†C. J. Drake, Ph. D., *Head of Dept.; Chief Ent. (State Ent.).*
•E. R. Becker, D. Sc., *Assoc. Prof. Protozool.*
‡F. D. Butcher, A. B., *Ext. Ent.*
†G. C. Decker, M. S., *Asst. Ent.*
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•H. M. Harris, M. S., *Asst. Prof. Zool. and Ent.*
•G. O. Hendrickson, M. S., *Instr. Zool.*
•H. H. Knight, Ph. D., *Assoc. Prof. Ent.*

Zoology and Entomology—Continued.

‡Henry Ness, B. S., *Asst. State Ent.*
•‡F. B. Paddock, M. S., *Assoc. Prof. Apiculture (State Apiarist).*
•†O. W. Park, Ph. D., *Assoc. Prof. and Asst. Chief in Apiculture.*
•Erma A. Smith, Ph. D., *Assoc Prof. Physiol.*
•W. H. Wellhouse, Ph. D., *Assoc. Prof. Ent.*
†A. D. Worthington, *Ext. Asst. in Apiculture.*

Miscellaneous:

‡E. H. Richardson, *Photog.*
†Odessa Short, *Asst. Photog*

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‡H. J. C. Umberger, B. S., *Dean and Dir. Div. of Ext.*

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•†C. O. Swanson, Ph. D., *Head Dept. of Milling Indus.*
•†A. E. Aldous, B. S., *Prof. Agron.; Pasture Mgt.*
†A. M. Brunson, Ph. D., *Assoc. in Plant Brdg. (Coop. U. S. D. A.).*
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†R. H. Davis, B. S., *Asst. in Soil Survey.*
•†F. L. Duley, Ph. D., *Assoc. Prof. Agron.; Soils.*
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†G. H. Phinney, *Foreman of Agron. Farm.*
•†S. C. Salmon, M. S., *Prof. Agron.; Farm Crops.*
•†M. C. Sewell, Ph. D., *Assoc Prof. Agron.; Soils.*
‡H. R. Sumner, M. A., *Ext. Assoc Prof. Farm Crops.*
‡E. B. Wells, M. S., *Ext. Assoc. Prof. Soils.*

Agronomy—Continued.

‡L. E. Willoughby, B. S., *Ext. Assoc. Prof. Farm Crops.*
•†E. B. Working, Ph. D., *Assoc. Prof. Milling Indus.; Wheat and Flour Invest.*
•‡J. W. Zahnley, M. S., *Assoc. Prof. Agron.; Farm Crops. Dir. Seed Lab.*

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•†C. W. McCampbell, B. S., D. V. M., *Head of Dept.*
•†M. A. Alexander, M. S., *Instr. An. Husb.; Asst. in An. Husb. Invest.*
•†B. M. Anderson, B. S., *Assoc. Prof. An. Husb.; Cattle Invest.*
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‡J. J. Moxley, B. S., *Ext. Asst. Prof. An. Husb.*
•†H. E. Reed, B. S., *Assoc. Prof. An. Husb.; Sheep Invest.*

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•†C. A. Brandly, D. V. M., *Instr. Bact.; Poultry Disease Invest.*
•†A. C. Fay, M. S., *Assoc. Prof. Bact.; Dairy Bact.*

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- *W. B. Sarles, M. S., *Instr. Bact.*

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- *†L. E. Melchers,[1] M. S., *Head of Dept. (Coop. U. S. D. A.).*
- *†E. C. Miller, Ph. D., *Prof. Bot.; Plant Physiol. Actg. Head of Dept.*
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- *Nora E. Dalbey, A. M., *Asst. Prof. Bot. and Plant Path.*
- *W. E. Davis, A. B., *Assoc. Prof. Bot.*
- *†O. H. Elmer, Ph. D., *Asst. Prof. and Asst. Plant Path.*
- ‡Hurley Fellows, Ph. D., *Cereal Disease Invest. (Coop. U. S. D. A.).*
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- †J. C. Frazier, A. M., *Asst. in Bot.*
- *F. C. Gates, Ph. D., *Assoc. Prof. Bot.*
- ‡C. E. Graves, B. S., *Ext. Asst. Prof. Plant Path.*
- *H. H. Haymaker, Ph. D., *Prof. Bot. and Plant Path.*
- *Elsa O. Horn, M. S., *Asst. in Bot. and Plant Path.*
- †C. O. Johnston, M. S., *Asst. in Cereal Diseases (Coop. U. S. D. A.).*
- †J. L. Weimer, Ph. D., *Assoc. in Forage Crop Disease Invest. (Coop. U. S. D. A.).*

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- *†J. S. Hughes, Ph. D., *Prof. Chem.; An. Nutr.*
- *†J. T. Willard, D. Sc., *Vice Pres. of Coll.; Consult. Chem.*
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- *A. E. Guest, A. B., *Instr. Chem.*
- *E. B. Keith, Ph. D., *Asst. Prof. Chem.*
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- *†H. J. Brooks, M. S., *Instr. Dairy Husb.; Official Testing.*
- *†W. J. Caulfield, M. S., *Instr. and Asst. Dairy Husb.*
- *†H. W. Cave, M. S., *Prof. Dairy Husb.; Dairy Prod.*

[1] On leave.

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- ‡J. W. Linn, B. S., *Ext. Assoc. Prof. Dairy Husb.*
- *†R. H. Lush, M. S., *Asst. Prof. Dairy Husb.; Dairy Husb. Invest.*
- *†W. H. Martin, M. S., *Assoc. Prof. Dairy Husb.; in charge Dairy Mfrs.*

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- ‡W. G. Ward, B. S., *Ext. Prof. in charge Rural Engin.*

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[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

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- †A. P. Loomis, *Supt. Poultry Plant.*
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- ‡C. E. Harris, B. S., *Field Agt. in Poultry Husb.*
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‡R. C. Miller, M. S., *Field Agt. in An. Husb.*
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†A. M. Peter, D. Sc., *Chem.*
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‡Z. L. Galloway, B. S., *Field Agt. in Farm Mgt.* (*Coop. U. S. D. A.: P. O., Mayfield*).
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[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

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*R. L. Davenport, M. S., *Asst Prof. Agr. Ed.*

Engineering (Agr.):
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*E. B. Doran, B. S., *Prof. Farm Mech.*
†C. L. Osterberger, B. S., *Farm Mech. Specialist.*

Entomology—*See* **Zoology.**

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*Hazel Baker, B. S., *Instr. Home Econ.*
*Helen M. Carter, M. A., *Assoc. Prof. Home Econ.*
*Frances Kirkpatrick, B. S., *Instr. Home Econ.*

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‡D. B. Demeritt, B. S., M. F., *For. Specialist.*
‡H. W. Fristoe, B. S., *Garden Specialist.*
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*R. L. Mayhew, Ph. D., *Asst. Prof. Zool.*
††B. A. Osterberger, B. S., *Asst. Ent.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

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†Herbert Spencer, Ph. D., *Asst. Ent. and Parasitol.*
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*H. W. Hall, M. S., *Instr. An. Indus.*
‡R. F. Talbot, B. S., *Dairy Specialist.*
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*E. R. Hitchner, M. S., *Assoc. Prof. Bact.*

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†J. W. Gowen, Ph. D., *Biol.* (*Collaborating*).
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†Mrs. Margaret S. Dermen, M. A., *Asst. in Biol.*
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†J. H. Hawkins, M. S., *Asst. Ent.*
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•C. W. L. Chapman, M. S., *Asst. Prof. For.*
‡R. M. Hutchinson, B. S., *For. Specialist.*
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•Beulah E. Osgood, B. S., *Instr. Home Econ.*
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•M. F. Babb, B. S., *Instr. Hort.*
•G. W. Woodbury, B. S., *Instr. Hort.*

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†T. T. Ayers, B. S., *Asst. Plant Path.*
†Reiner Bonde, M. S., *Asst. Plant Path.*
†Edith C. Merchant, B. A., *Asst. Plant Path.*
†Kathleen M. Sullivan, *Lab. Asst. in Plant Path.*

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‡T. B. Symons, M. S., D. Agr., *Dir. of Ext. Service*
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•†G. F. Eppley, M. S., *Assoc. Prof. and Asst. Agron.*
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‡F. W. Oldenburg, B. S., *Agron. Specialist.*
†R. G. Rothgeb, M. S., *Asst. in Agron.*
†J. M. Snyder, B. S., *Asst. in Soil Invest.*

Agronomy—Continued.
†R. L. Sellman, B. S., *Asst. Agron. and Farm Supt.*
†H. B. Wilmant, M. S., *Asst. in Soil Invest.*

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•†‡DeVoe Meade, Ph. D., *Prof. An. and Dairy Husb.; An. and Dairy Husb.*
•†B. E. Carmichael, M. S., *Prof. An. Husb.; An. Husb.*
‡K. A. Clark, M. S., *An. Husb. Specialist.*
‡J. A. Conover, B. S., *Dairy Specialist.*
•†W. E. Hunt, M. S., *Asst. Prof. and Asst. An. Husb.*

[1] For subject matter workers see the respective division, i. e., agronomy, animal industry, etc.

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- *†R. C. Munkwitz, M. S., *Asst. Prof. and Asst. Dairy Husb.*

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- *J. E. Faber, jr., M. S., *Asst. in Bact.*
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- *†L. J. Poelma, D. V. M., *Asst. Prof. Dairy Bact.; Asst. An. Path.*
- *R. C. Reed, Ph. B., D. V. M., *Prof. An. Path.*
- *M. F. Welsh, D. V. M., *Asst. Prof. Bact. and An. Path.*

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- ‡Olive M. Kelk, *Asst. in Seed Insp.*
- †Ruth M. Mostyn, *Asst. in Seed Insp.*
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- *R. C. Wiley, Ph. D., *Assoc. Prof. Chem.*

Economics—*See* **Farm Management.**

Editorial—*See* **Journalism.**

Education (Agr.):[1]
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- *‡C. S. Richardson, A. M., *Specialist in Ed. Ext.*

Engineering (Agr.):
- *‡R. W. Carpenter, A. B., LL. B., *Prof. Agr. Engin.*

Entomology:
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- *Paul Knight, M. S., *Instr. Ent.*
- †H. S. McConnell, M. S., *Assoc. Ent.*
- P. D. Sanders, M. S., *Assoc. Ent.*

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- ‡E. G. Jenkins, *State Boys' Club Agt.*
- ‡Dorothy Emerson, *Girls' Club Agt.*

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- ‡S. B. Shaw, B. S., *Chief Insp. and Mktg. Specialist.*
- †W. P. Walker, M. S., *Asst. Agr. Econ.*

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- *Edna Henderson, B. S., *Asst. in Home Econ.*
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- ‡W. R. Ballard, B. S., *Landsc. and Veg. Gard. Specialist.*
- *J. B. Blandford, *Instr. and Hort. Supt.*
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- †F. E. Gardner, Ph. D., *Asst. in Plant Propagation.*
- *†F. W. Gelse, M. S., *Prof. Oler.; Oler.*
- ‡L. M. Goodwin, B. S., *Canning Crops Specialist* (*P. O., Denton*).
- †A. L. Schrader, Ph. D., *Assoc. Pomol.*
- *A. S. Thurston, M. S., *Assoc. Prof. Flor. and Landsc. Gard.*
- ‡A. F. Yherheller, M. S., *Hort. Specialist.*

[1] Courses given in College of Education.

[2] For subject-matter workers see the respective division, i. e., agronomy, animal and dairy husbandry, etc.

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*W. E. Whitehouse, M. S., *Asst. Prof. Pomol.*

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‡M. D. Bowers, B. S., *Specialist in Agr. Journalism.*

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†J. B. S. Norton, D. Sc., *Plant Path.*
*†C. E. Temple, M. A., *Prof. Plant Path. (State Plant Path.).*
‡H. A. Hunter, B. S., *Asst. Plant Path.*
‡‡R. A. Jehle, Ph. D., *Assoc. and Specialist in Plant Path.*

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*†C. O. Appleman, Ph. D., *Prof. Plant Physiol. and Biochem.; Plant Physiol. Dean of Grad. School.*

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*†G. D. Quigley, B. S., *Asst. Prof. and Asst. Poultry Husb.*
†W. H. Rice, B. S., *Poultry Specialist.*

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*†L. A. Bradley, Ph. D., *Asst. Research Prof. Bact.*
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*Mary E. M. Garvey, B. S., *Instr. Physiol.*
‡Joseph Kuzmeski, *Tech. Asst.*

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†P. A. McLaughlin, B. S., *Asst. Research Prof. Bot.*

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†H. D. Haskins, B. S., *Official Chem. in Fert. Control.*
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•J. B. Newlon, *Instr. Agr. Engin.*
•G. F. Pushee, *Instr. Agr. Engin.*

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‡E. S. Carpenter, M. S., *Supvr. Ext. Courses and Exhibits.*
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‡F. H. Branch, B. S., *Ext. Prof. Farm Mgt.*
†M. V. Brown, B. S., *Lab. Asst. in Farm Mgt.*
†R. L. Mighell, M. S., *Invest. in Farm Mgt.*

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‡Esther B. Cooley, B. S., *Asst. Ext. Prof. Clothing.*
‡May E. Foley, A. M., *Asst. Ext. Prof. Nutr.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal and dairy husbandry, etc.

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*C. E. Gordon, Ph. D., *Head of Dept.*
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‡R. V. Gunn, B. S., *Econ. Specialist.*

[1] On leave.

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- •†E. E. Down, B. S., M. Agr., *Asst. Prof. and Research Assoc. in Farm Crops (Coop. U. S. D. A.).*

[1] For subject-matter workers see the respective division i. e., animal husbandry, botany, etc.

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†G. A. Getman, *Field Foreman in Farm Crops.*
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††R. H. Morrish, B. S., *Research Asst. and Specialist in Farm Crops.*
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†B. B. Robinson, M. S., *Flax Breeder (Coop. U. S. D. A.).*
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*†H. J. Stafseth, D. V. M., M. S., *Assoc. Prof. and Research Assoc. Bact.*
†Frank Thorp, jr., D. V. M., M. S., *Asst. in Bact.*
†J. P. Torrey, M. S., *Research Asst. in Bact.*

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*S. G. Bergquist, A. B., *Assoc. Prof. Geol.*
*W. A. Kelly, Ph. D., *Instr. Geol.*
*J. W. Stack, M. S., *Assoc. Prof. Zool.*

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*†E. B. Hill, M. Agr., M. S., *Asst. to Dean and Dir.*
*R. S. Hudson, B. S., *Farm Supt.*
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‡E. A. Hanson, B. S., *in charge Cow Testing Assoc. Work.*

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*‡W. E. Petersen, M. S., *Asst. Prof. Dairy Husb., Supt. Official Tests.*
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*M. G. Jacobson, *Instr. Farm Bldgs.*

[1] On leave.

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[1] For subject-matter workers see the respective division, i. e., animal husbandry, biochemistry, etc.

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†R. B. Harvey,[1] Ph. D., *Assoc. Plant Physiol.*
•†H. W. Johnson, M. S., *Instr. and Asst. in Plant Path.*
•†A. H. Larson, B. S., *Asst. Prof. Plant Path.; Seed Analyst.*
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‡R. C. Rose, M. S., *Plant Path. Specialist.*
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[1] On leave.

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[1] On leave.

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- *Le Roy Johnson, B. S., *Instr. Chem.*
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- *M. E. Coe, M. S., *Asst. Prof. Poultry Husb.*
- ‡G. R. Sipe, *Ext. Poultry Husb.*

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- †A. L. Hamner, M. S., *Asst. Ent.*
- †J. M. Langston, M. S., *Asst. Ent. (Coop. U. S. D. A.).*
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- Coastal Plains Sta., *P. O., McNeill*—S. W. Greene, *in charge (Coop. U. S. D. A.).*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

Substations—Continued.

Delta Branch Sta., *P. O., Stoneville*—
W. E. Ayres, M. S., *Asst. Dir. and Plant Breeder.*
K. C. Livingston, *Farm Foreman.*
J. B. Turner, B. S., *Assistant.*
H. A. York, B. S., *Assistant.*

Holly Springs Branch Sta., *P. O., Holly Springs*—
C. T. Ames, B. S., *Asst. Dir.*
O. B. Casanova, B. S., *Assistant.*
O. K. Morgan, *Farm Foreman.*

Substations—Continued.

Raymond Branch Sta., *P. O., Raymond*
H. F. Wallace, B. S., *Asst. Dir.*
J. C. Peyton, *Farm Foreman.*

South Miss. Branch Sta., *P. O., Poplarville*
E. B. Ferris, M. S., *Asst. Dir.*
W. S. Anderson, B. S., *Hort.*
B. V. Evans, *Farm Foreman.*

Alcorn Agricultural and Mechanical College, *Alcorn*

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*L. J. Rowan, Ph. D., *President*

*P. S. Bowles, B. S., *Prof. Agr. Ed.*
*A. T. Busby, B. S., *Prof. Agr.*
*E. R. Correll, B. S., *Instr. Farm Mech.*
*Sarah P. Holmes, *Instr. Dom. Sci.*
*Selma C. Jackson, *Instr. Nurse Training.*
*Mrs. B. M. Johnson, *Instr. Housekeeping.*
*L. J. McKay, B. S., *Farm Supt.*
*W. S. Nelson, *Instr. Laundering.*
*Mrs. Eunice D. Powell, B. S., *Prof. Home Econ.*
*O. W. Sanders, B. S., *Asst. Prof. Agr. Ed.*
*Mrs. Alice G. Tanner, *Instr. Dom. Art.*
*H. T. Tanner, *Prof. Hort.*
*J. B. Wright, B. S., *Asst. Prof. Agr. Ed.*

MISSOURI

College of Agriculture and the Agricultural Experiment Station of the University of Missouri,[1] *Columbia*

*College faculty. †Station staff. ‡Extension staff

*S. D. Brooks, A. M., LL. D., *President of University*
*†F. B. Mumford, M. S., D. Agr., *Dean Coll. of Agr., Dir. of Sta. Prof. An. Husb.*
‡A. J. Meyer, B. S., *Dir. of Agr. Ext. Service*

Animal Husbandry:

*†E. A. Trowbridge, B. S., *Prof. and Chair of Dept.*
†J. W. Burch, B. S., *Ext. Assoc. Prof. An. Husb.*
*†D. W. Chittenden, A. M., *Asst. Prof. An. Husb.*
*†J. E. Comfort, B. S., *Asst. in An. Husb.*
*†M. T. Foster, A. M., *Instr. An. Husb.*
†H. M. Garlock, B. S., *Ext. Asst. Prof. An. Husb.*
*†H. C. Moffett, B. S., *Asst. in An. Husb.*
*‡L. A. Weaver, B. S., *Prof. An. Husb.*

Botany:

*†W. J. Robbins, Ph. D., *Prof. and Chair. of Dept.*
*W. E. Manneval, Ph. D., *Asst. Prof. Bot.*
*E. E. Naylor, A. M., *Instr. Bot.*
*H. W. Rickett, Ph. D., *Asst. Prof. Bot.*
*†I. T. Scott, Ph. D., *Asst. Prof Bot. and Plant Path.*

Chemistry (Agr.):

*†A. G. Hogan, Ph. D., *Chair. of Dept. and Prof. An. Nutr.*
*†Robert Boucher, jr., A. B., *Asst. in Agr. Chem.*

Chemistry (Agr.)—Continued.

*Sidney Calvert, A. M. *Prof. Org. Chem.*
*†E. W. Cowan, A. M., *Instr. Agr. Chem.*
*†L. D. Haigh, Ph. D., *Assoc. Prof. Agr. Chem.*
†A. R. Hall, B. S., *Instr. Agr. Chem.*
†J. E. Hunter, A. M., *Asst. in Agr. Chem.*
*†W. S. Ritchie, Ph. D., *Asst. Prof. Agr. Chem.*
*Herman Schlundt, Ph. D., *Prof. Phys. Chem.*
†C. L. Shrewsbury, A. B., *Asst. in Agr. Chem.*

Dairy Husbandry:

*†A. C. Ragsdale, M. S., *Prof. and Chair. of Dept.*
*†Samuel Brody, M. A., *Asst. Prof. Dairy Chem.*
*†E. C. Elting, A. M., *Instr. Dairy Husb.*
*†F. R. Garrison, B. S., *Asst. in Dairy Husb.*
*†Warren Gifford, A. M., *Asst. Prof. Dairy Husb.*
†M. J. Regan, B. S., *Ext. Asst. Prof. Dairy Husb.*
*†W. H. E. Reid, M. A., *Assoc. Prof. Dairy Husb.*

[1] This institution gives the academic title to all employees.

Dairy Husbandry—Continued.
‡A. F. Stephens, B. S., *Ext. Asst. Prof. Dairy Husb.*
•†C. W. Turner, Ph. D., *Asst. Prof. Dairy Husb.*
•†C. W Weber, A M., *Instr. Dairy Husb.*

Economics (Agr.):
•†O. R. Johnson, A. M., *Prof. and Chair. of Dept.*
•†B. H. Frame, A. M., *Asst. Prof. Agr. Econ.*
•†S. D. Gromer, A. M., LL. D., *Assoc. Prof. Agr. Econ.*
‡H. C. Hensley, B. S., *Ext. Asst. Prof. Agr. Econ.*
•†Preston Richards, B. S., *Asst. in Agr. Econ.*
†J. N. Rowell, B. S., *Research Asst. in Agr. Econ.*
•†F. L. Thomsen, Ph. D., *Asst. Prof. Agr. Econ.*
•†G. B. Thorne, B. S., *Instr. Agr. Econ.*
‡D. C. Wood, B. S., *Ext. Asst. Prof. Agr. Econ.*

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•†‡A. A. Jeffrey, A. B., *Agr. Editor.*
•J. H. Casey, B. J., *Asst. Prof. Agr. Journalism.*
‡T. L. Cleary, M. S., *Asst. Agr. Editor.*

Education (Agr.):
•Sherman Dickinson, Ph. D., *Prof. Agr. Ed.*
•G. J. Dippold, A. M., *Asst. Prof. Agr. Ed.*

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•†J. C. Wooley, M. S. in A. E., *Prof. and Chair. of Dept.*
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‡H. W. Le Mert, B. S., *Ext. Instr. Agr. Engin.*
‡A. J. McAdams, B. S., *Ext. Asst. Prof. Agr. Engin.*
•†R. R. Parks, B. S., *Instr. Agr. Engin.*

Entomology:
•†Leonard Haseman, Ph. D., *Prof. and Chair. of Dept. (State Ent.).*
•†K. C. Sullivan, Ph. D., *Asst. Prof. Ent. Deputy Nursery Insp.*

Extension (Admin.):[1]
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‡Sara H. Chiles, B. S., *Asst. Boys' and Girls' Club Agt.*
‡R. H. Emberson, B. S., *Boys' and Girls' Club Agt.*
‡C. C. Hearne, B. S., *State Ext. Agt.*

Extension (Admin.)—Continued.
‡Jane Hinote, B. S., *Boys' and Girls' Club Agt.*
‡Margaret C. Huston, A. B., *Boys' and Girls' Club Agt.*
‡T. T. Martin, A. B., *Boys' and Girls' Club Agt.*
‡Gladys Mullenburg, M. S., *Asst. State Ext. Agt.*
‡P. B. Naylor, A. B., *State Ext. Agt.*
‡J. F. Nicholson, M. S., *State Ext. Agt.*
‡R. R. Thomasson, B. S., *State Ext. Agt.*

Field Crops:
•†W. C. Etheridge, Ph. D., *Prof. and Chair. of Dept.*
‡C. E. Carter, B. S., *Ext. Assoc. Prof. Field Crops.*
†Clara Fuhr, *Seed Analyst (Coop. U. S. D. A.).*
‡K. G. Harman, B. S., *Ext. Asst. Prof. Field Crops.*
•†C. A. Helm, A. M., *Assoc. Prof. Field Crops.*
•†B. M. King, A. M., *Instr. Field Crops.*
•†R. T. Kirkpatrick, M. A., *Instr. Field Crops.*
•†L. J. Stadler, Ph. D., *Assoc. Prof. Field Crops.*
‡I. P. Trotter, M. S., *Ext. Asst. Prof. Field Crops.*

Geology:
•E. B. Branson, Ph. D., *Prof. and Chair. of Dept.*
•W. A. Tarr, Ph. D., *Prof. Geol.*

Home Economics:
•†Mabel V. Campbell, A. M., *Prof. and Chair. of Dept.*
•Edna Amidon, M. S., *Asst. Prof. Home Econ.*
•Mildred Briggs, M. S., *Asst. Prof. Home Econ.*
‡I. Fra Clark, B. S., *Ext. Asst. Prof. Home Econ.*
•†Jessie A. Cline, A. M., *Assoc. Prof. Home Econ.*
•Jessie V. Coles, M. A., *Asst. Prof. Home Econ.*
†Celia W. Cranghead, B. S., *Research Asst. Home Econ.*
†Georgya S. Craig, B. S., *Research Asst. Home Econ.*
‡Mrs. Bina S. Davis, B. S., *Ext. Instr. Home Econ.*
•Adella I. Eppel, M. S., *Asst. Prof. Home Econ.*
•Ella P. French, R. N., *Instr. Home Nursing.*

[1] For subject-matter workers see the respective division, i. e., animal husbandry, botany, etc.

Home Economics—Continued.

•†Margaret C. Hessler, Ph. D., *Asst. Prof. Home Econ.*
‡Essie M. Heyle, Ph. B., *Prof. in charge Home Econ. Ext.*
•Mary L. Klingner, A. M., *Asst. Prof. Home Econ. Ed.*
‡Lois Martin, B. S., *Ext. Asst. Prof. Home Econ.*
•Mary E. Polson, A. M., *Asst. Prof. Home Econ.*
‡Mary E. Robinson, B. S., *Ext. Assoc. Prof. Home Econ.*
‡Julia M. Rocheford, Pe. B., *Ext. Asst. Prof. Home Econ.*
†E. Charlotte Rogers, A. M., *Research Asst. Home Econ.*
•Rebecca Sholley, A. M., *Asst. Prof. Home Econ.*
‡Mary E. Stebbins, R. N., *Ext. Asst. Prof. Home Econ.*
‡Mrs. Edith G. Van Deusen, Ph. B., *Ext. Asst. Prof. Home Econ.*
•Lila M. Welch, M. A., *Asst. Prof. Home Econ. Ed.*
•Bertha K. Whipple, M. S., *Asst. Prof. Home Econ.*
‡Marion K. White, B. S., *Ext. Asst. Prof. Home. Econ.*

Horticulture:

•†T. J. Talbert, A. M., *Prof. and Chair. of Dept.*
‡E. A. Bierbaum, B. S., *Ext. Instr. Hort.*
•†H. D. Hooker, jr., Ph. D., *Assoc. Prof. Hort.*
•H. F. Major, B. S., *Assoc. Prof. Landsc. Gard. and Supt. of Grounds.*
•†A. E. Murneek, Ph. D., *Asst. Prof. Hort.*
•†J. T. Quinn, A. M., *Asst. Prof. Hort.*
•†H. G. Swartwout, M. A., *Asst. Prof. Hort.*

Physics:

•O. M. Stewart, Ph. D., *Prof. and Chair. of Dept.*
•H. M. Reese, Ph. D., *Prof. Phys*

Poultry Husbandry:

•†H. L. Kempster, B. S., *Prof. and Chair. of Dept.*
‡Harold Canfield, M. S., *Ext. Asst. Prof. Poultry Husb.*
•†E. M. Funk, A. M., *Instr. Poultry Husb.*
•†E. W. Henderson, A. M., *Asst. Prof Poultry Husb.*
‡Berley Winton, A. M., *Ext. Asst. Prof. Poultry Husb.*

[1] On leave.

Sociology (Rural):

•†E. L. Morgan, A. M., *Prof. and Chair. of Dept.*
†H. J. Burt, M. A., *Research Asst. in Rural Sociol.*
‡B. L. Hummel, B. S., *Ext. Asst. Prof. Rural Sociol.*
•†Eleanor L. Lattimore, Ph. D., *Asst. Prof. Rural Sociol*
•†Ada C. Niedermeyer, A. B., *Instr. Rural Sociol.*

Soils:

•†M. F. Miller, M. S., *Prof. and Chair. of Dept.*
•†W. A. Albrecht, Ph. D., *Assoc. Prof. Soils.*
•†Richard Bradfield,[1] Ph. D., *Assoc. Prof. Soils.*
‡O. T. Coleman, B. S., *Ext. Instr. Soils.*
•†Hans Jenny, Ph. D., *Instr. Soils.*
•†H. H. Krusekopf, A. M., *Prof. Soils.*
‡P. F. Schowengerdt, B. S., *Ext. Assoc. Prof. Soils.*
‡R. J. Silkett, B. S., *Ext. Asst. Prof. Soils.*
†R. E. Uhland, A. M., *Instr. Soils.*

Veterinary Science:

•†J. W. Connaway, D. V. S., M. D., *Chair. of Dept. Prof. Vet. and Comp. Med.*
†O. S. Crisler, D. V. M., *Supt. Serum Plant.*
•†R. L. Crouch, B. S., *Instr. Vet. Sci.*
•†A. J. Durant, A. M., D. V. M., *Assoc. Prof. Vet. Sci.*
•†A. W. Uren, D. V. M., *Instr. Vet. Sci.*

Zoology:

•†W. C. Curtis, Ph. D., *Prof. and Chair. of Dept.*
•Rudolf Bennitt, Ph. D., *Assoc. Prof. Zool.*
•Mary J. Guthrie, Ph. D., *Assoc. Prof. Zool.*
•R. G. Stone, A. M., *Instr. Zool.*
•G. W. Tannreuther, Ph. D., *Assoc. Prof. Zool.*
•F. H. Woods, A. M., *Instr. Zool.*

Miscellaneous:

†J. P. Barham, *Photog.*
•†‡E. E. Brown, *Business Mgr.*
•Leslie Cowan, B. S. in C. E., *Secy.*
•†Jane Frodsham, *in charge Agr. Libr.*
•†R. B. Price, *Treas.*
•George Reeder, *Lect. on Met. and Climat., Met. U. S. Weather Bureau.*
•†S. B. Shirky, A. M., *Supt. Short Courses, Asst to Dean and to Dir. of Sta.*

Missouri State Fruit Experiment Station, *Mountain Grove*

†Station staff

†F. W. Faurot, B. S., *Director*

Missouri State Poultry Experiment Station, *Mountain Grove*

†Station staff

†T. W. Noland, *Director*

†Ethel Byer, *Asst. Secy.* | †W. A. Hovis, *Lab. Tech.*

Lincoln University, *Jefferson City*

•Agricultural faculty

•N. B. Young, A. M., Litt. D., LL. D., *President*

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•A. L. Hammons, B. S., *Agr.*
•W. B. Jason, M. A., *Phys.*
•E. B. Jones, M. S., *Biol.*
•Eunice V. Pepsico, A. M., *Home Econ. (Clothing).*
•Margaret R. Wilkins, A. B., *Home Econ. (Foods).*

MONTANA

Montana State College of Agriculture and Mechanic Arts and the Agricultural Experiment Station, *Bozeman*

•College faculty. †Station staff. ‡Extension staff

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•†F. B. Linfield, B. S. A., *Dean of Agr., Dir. of Sta. Actg. President*
‡J. C. Taylor, B. S., *Dir. of Ext. Service*

Agronomy:
•†‡Clyde McKee, B. S., *Head of Dept. Vice Dean of Agr.*
†William DeYoung, A. M., *Asst. in Agron. (Soils).*
†L. F. Gieseker, M. S., *Assoc. Agron. in charge Soil Survey Work.*
•†J. E. Norton, M. S., *Instr. and Asst. in Agron.*
‡A. J. Ogaard, B. S., *Agron. Specialist.*
•†A. H. Post, M. S., *Asst. Prof. and Asst. Agron.*
•†LeRoy Powers, M. S., *Instr. and Asst. in Agron.*

Animal Industry:
•†H. W. Vaughan, M. S., *Head of Dept.*
‡Harriette E. Cushman, B. S., *Poultry Specialist.*
•†W. E. Joseph, Ph. D., *Assoc. Prof. and Assoc. An. Husb.*
•R. C. McChord, B. S., *Assoc. Prof. An. Husb.*
•J. A. Nelson, M. S., *Assoc. Prof. in charge Dairy Mfg.*
•‡J. O. Tretsven, B. S., *Assoc. Prof. An. Husb. and Dairy Specialist.*
†Louis Vinke, M. S., *Asst. An. Husb.*
‡R. L. Waddell, B. S. *Livestock Specialist.*

Botany and Bacteriology:
•†D. B. Swingle, M. S., *Head of Dept.*
•F. B. Cotner, A. M., *Assoc. Prof. Bot. and Bact.*
†‡H. E. Morris, M. S., *Assoc. Bot. and Bact.*
†P. A. Young, Ph. D., *Asst. Bot. and Bact.*

Chemistry:
†Edmund Burke, B. S., *Head of Sta. Dept. Met.*
•W. M. Coblelgh, A. M., *Head of Coll. Dept. (State Chem.)*
•P. C. Gaines, B. S., *Instr. Chem.*
†J. R. Green, B. S., *Asst. in Chem.*
†B. L. Herrington, B. S., *Asst. Chem.*
•D. T. Jackson, B. S., *Asst. in Chem.*
†A. H. Johnson, Ph. D., *Asst. Chem.*
•B. L. Johnson, Ph. D., *Asst. Prof. Chem.*
†S. G. Scott, B. S., *Asst. Chem.*
•O. E. Sheppard, A. M., *Asst. Prof. Chem.*

Economics (Agr.) and Farm Management:
•†J. M. Hamilton, M. S., *Head of Dept. Prof. Econ.*
†‡M. L. Wilson, M. S., *Agr. Econ.*
‡Benjamin Alvord, B. S., *Farm Mgt. Dem.*
•†J. W. Barger, M. S., *Asst. Prof. Econ.; Asst. Rural Sociol.*
†E. J. Bell, jr., B. S., *Asst. Agr. Econ.*
•†S. E. Johnson, M. S., *Asst. Prof. and Asst. Agr. Econ.*
‡Ruth Montgomery, B. S., *Asst. in Agr. Econ.*
•†Elmer Starch, B. S., *Instr. and Asst. in Agr. Econ.*

Editorial—*See* Publications.

Education (Agr.):
•M. J. Abbey, A. B., *Prof. and State Supvr. Agr. Ed.*

[1] On leave.

Engineering (Agr.):
- *†‡H. E. Murdock, C. E., M. E., *Head of Dept.*
- *†R. M. Merrill, B. S., *Asst. Prof. and Asst. Agr. Engin.*
- *†V. D. Young, M. S., *Instr. and Asst. in Agr. Engin.*

Entomology:
- *†R. A. Cooley, B. S., *Head of Dept. (State Ent.).*
- †W. C. Cook, Ph. D., *Asst. Ent.*
- ††W. B. Mabee, B. S., *Assoc. Ent.*
- †J. R. Parker, M. S., *Ent.*
- †C. B. Phillip, M. S., *Asst. Ent.*

Extension (Admin.):[1]
- Director Taylor *in charge.*
- ‡Fred Bennion, A. B., *County Agt. Leader.*
- ‡Blanche L. Lee, B. S., *State Home Dem. Leader.*
- ‡C. E. Potter, B. S., *State Club Leader.*
- ‡M. Vangel Russell, B. S., *Asst. State Club Leader.*

Home Economics:
- *Gladys A. Branegan, A. M., *Prof. Home Econ.*
- †Jessie E. Richardson, Ph. D., *Head of Research Home Econ.*
- *Kathleen Bennett, M. A., *Asst. Prof. Home Econ.*
- ‡E. Miriam Hawkins, B. S., *Home Mgt. Specialist.*
- *Agnes E. Hutchinson, A. M., *Asst. Prof. Home Econ.*
- ‡Jessie M. McQueen, M. A., *Nutr. Specialist.*
- ‡Edith J. Mott, M. A., *Clothing Specialist.*
- *Mildred E. Nemeck, B. S., *Instr. Home Econ., House Dir.*
- *Rua R. Van Horn, A. M., *Asst. Prof. Home Econ.*

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- ‡E. E. Isaac, B. S., *Hort. Specialist.*
- *†C. C. Starring, M. S., *Asst. Prof. and Assoc. Hort.*

Publications:
- *†‡R. B. Bowden, *Dir. and Agr. Editor.*
- *‡John Dexter, B. S., *Asst. Dir. and Asst. Agr. Editor.*

Veterinary Science:
- *†Howard Welch, D. V. M., *Head of Dept.*
- *†Erwin Jungherr, D. V. M., Ph. D., *Instr. and Asst. in Vet Sci.*

Zoology:
- *M. H. Spaulding, A. M., *Head of Dept.*

Grain Inspection Laboratory:
- †W. O. Whitcomb,[2] M. S., *Supt.*
- †W. D. Hay, B. S., *Seed Analyst and Lab. Asst.*
- †J. P. Lewis, B. S., *Lab. Asst.*

Miscellaneous:
- *Elizabeth Forrest, B. L. S., A. M., *Libr.*

Substations:

Hort. Substa., *P. O. Victor*—W. E. Pollinger, *Supt.*

Huntley Substa., *P. O. Huntley*—
- Dan Hansen, *Supt.* (*Coop. U. S. D. A.*).
- T. W. Mosely, M. S., *Dairying* (*Coop. U. S. D. A.*).
- A. E. Seamans, B. S., *Dry Farming* (*Coop U. S. D. A.*).

Judith Basin Substa., *P. O. Moccasin*—
- I. J. Jensen, M. S., *Supt.* (*Coop. U. S. D. A.*).
- B. B. Bayles, M. S., *Cereal Invest.* (*Coop. U. S. D. A.*).

Northern Mont. Substa., *P. O. Havre*—
- G. W. Morgan, B. S., *Supt.* (*Coop. U. S. D. A.*).
- M. A. Bell, B. S., *Asst. Supt.* (*Coop. U. S. D. A.*).
- Ernest Sandberg, B. S., *Asst. in Ag. Husb.* (*Coop. U. S. D. A.*).

NEBRASKA

College of Agriculture and the Agricultural Experiment Station of the University of Nebraska, *Lincoln*

*College faculty. †Station staff. ‡Extension staff

———— ————, *Chancellor of University*
- *†E. A. Burnett, D. Sc., *Dean Coll. of Agr., Dir. of Sta. Acting Chancellor*
- ‡W. H. Brokaw, *Dir. of Agr. Ext. Service*

Agronomy:
- *†W. W. Burr, B. S., *Chair. of Dept. and Acting Dir. of Sta.*
- *††T. A. Kiesselbach, Ph. D., *Prof. Agron.; Agron.*

Agronomy—Continued.
- †Arthur Anderson, M. S., *Asst. Agron.*
- †G. M. Rahrt, M. S., *Soil Analyst.*
- *†E. B. Engle, M. S., *Instr. and Asst. in Soils.*

[1] For subject matter workers see the respective division—i. e., agronomy, animal industry, etc.

[2] On leave.

Agronomy—Continued.
- •T. H. Goodding, M. S., *Asst. Prof. Agron.*
- ‡D. L. Gross, B. S., *Asst. State Ext. Agt. in Agron.*
- •F. D. Kelm, Ph. D., *Prof. Agron.*
- †W. E. Lyness, B. S., *Asst. Agron. and Supt. Agron. Farm.*
- •J. C. Russel, M. S., *Prof. Agron.*
- ‡P. H. Stewart, M. S., *State Ext. Agt. in Agron.*

Animal Husbandry:
- •†H. J. Gramlich, B. S., *Chair. of Dept.*
- •W. W. Derrick, B. S., *Instr. An. Husb.*
- •†W. J. Loeffel, B. S., *Assoc. Prof. An. Husb.; in charge Swine Invest.*
- ‡O. O. Waggener, B. S., *State Ext. Agt. in An. Husb.*
- •†A. D. Weber, M. S., *Asst. Prof. and Asst. An. Husb.*

Bacteriology (Agr.):
- •H. H. Walte, A. M., M. D., *Chair. of Dept.*
- •L. F. Lindgren, M. S., *Instr. Bact. and Path.*

Botany:
- •R. J. Pool, Ph. D., *Chair. of Dept.*
- •†G. L. Peltier, Ph. D., *Prof. Plant Path.; Plant Path.*
- •W. E. Bruner, A. M., *Instr. Bot.*
- •†R. W. Goss, Ph. D., *Assoc. Prof. and Assoc. Plant Path.*
- •C. E. Rosenquist, M. S., *Asst. Prof. Bot.*

Chemistry:
- •F. W. Upson, Ph. D., *Chair. of Dept.*
- •†M. J. Blish, Ph. D., *Prof. Agr. Chem.; Chem.*
- •R. C. Abbott, A. M., *Asst. Prof. Chem.*
- †C. W. Ackerson, Ph. D., *Asst. Chem.*
- †R. M. Sandstedt, M. S., *Asst. Chem.*
- •T. J. Thompson, Ph. D., *Assoc. Prof. Chem.*

Dairy Husbandry:
- •†H. P. Davis, M. S., *Chair. of Dept.*
- •†L. K. Crowe, M. S., *Instr. and Asst. in Dairy Husb.*
- •†P. A. Downs, Ph. D., *Assoc. Prof. and Assoc. Dairy Husb.*
- ‡M. L. Flack, M. S., *State Ext. Agt. in Dairy Husb.*
- •E. N. Hansen, M. S., *Instr. Dairy Husb.*
- •†I. L. Hathaway, M. S., *Instr. and Research Asst. in Dairy Husb.*
- •†R. F. Morgan, B. S., *Asst. Prof. and Asst. Dairy Husb.*
- •E. L. Reichart, B. S., *Instr. Dairy Husb. and Creamery Mgr.*

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- ‡G. R. Boomer, *State Ext. Agt. in Marketing.*

Economics (Rural)—Continued.
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- ‡N. W. Gaines, B. S., *State Ext. Agt. in Community Organ.*
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- †Harold Hedges, M. A., *Research Asst. Prof Rural Econ.*
- •A. W. Medlar, A. M., *Assoc. Prof. Rural Econ.*
- •†J. O. Rankin, A. M., *Assoc. Prof. and Assoc. in Rural Econ. (Coop. U. S. D. A.).*
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- •†E. E. Brackett, B. S. E. E., *Prof. Agr. Engin.; Agr. Engin.*
- •A. A. Baer, B. A., *Asst. Prof. Agr. Engin.*
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- •W. J. Runnalls, *Instructing Mechanic.*
- •C. W. Smith, M. S., *Prof. Agr. Engin.*
- †H. L. Wallace, M. S., *Research Engin.*
- ‡I. D. Wood, M. S., *State Ext. Agt. in Agr. Engin.*

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- •Raymond Roberts, B. S., *Instr. Ent.*
- •†D. B. Whelan, M. S., *Asst. Prof. and Asst. Ent.*

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- ‡L. I. Frisbie, B. S., *State Ext. Agt. in Club Work.*
- ‡H. G. Gould, B. S., *Ext. Leader, Western Dist.*
- ‡Jessie G. Greene, B. S., *Asst. State Ext. Agt. in Club Work.*
- ‡R. E. Holland, B. S., *Ext. Leader, Eastern Dist.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

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‡Allegra E. Wilkens, *Asst. State Ext. Agt. in Club Work.*

Forestry:
‡C. W. Watkins, B. S., *State Ext. Agt. in For.*

Home Economics:
•Margaret S. Fedde, A. M., *Chair. of Dept.*
‡Florence J. Atwood, B. S., *State Ext. Agt. in Foods and Nutr.*
•Marjorie Clark, M. S., *Instr. Home Econ.*
‡Rizpah A. Douglas, B. S., *State Ext. Agt. in Home Beautification.*
•Bernice Elwell, B. S., *Instr. Institutional Mgt.*
•Rebekah Gibbons, M. S., *Assoc. Prof. Home Econ.*
†Greta Gray, Ph. D., *Research Prof. Home Econ.*
‡Theresa Judge, B. S., *State Ext. Agt. in Clothing.*
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•Evelyn Metzger, *Asst. Prof. Home Econ.*
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‡Helen A. Rocke, B. S., *Asst. State Ext. Agt. in Clothing.*
•Gladys C. Ruby, A. M., *Instr. Home Econ.*
•Ruby V. Simpson, B. S., *Instr. Home Econ.*
‡Muriel L. Smith, B. S., *State Ext. Agt. in Home Mgt.*
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•Ruth Staples, B. S., *Asst. Prof. Home Econ.*
•Bess Steele, B. S., *Asst. Prof. Home Econ.*

Home Economics—Continued.
•Gladys Winegar, M. S., *Instr. Home Econ.*

Horticulture:
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‡E. H. Hoppert, B. S., *State Ext. Agt. in Hort.*
•†H. O. Werner, M. S., *Assoc. Prof. and Assoc. Hort.*
•†W. W. Yocum, M. A., *Instr. and Asst. Hort.*

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‡J. H. Claybaugh, B. S., *State Agt. in Poultry Husb.*
•S. J. Marsden, B. S., *Instr. Poultry Husb.*
‡J. R. Redditt, B. S., *State Ext. Agt. in Poultry Husb.*

Veterinary Science:
•†Lennis Van Es, M. D., V. S., *Chair. Dept. of An. Path. and Hyg.*
†S. W. Alford, D. V. S., *Supt. Serum Plant.*
†H. M. Martin, V. M. D., Ph. D., *Asst. in An. Path. and Hyg.*
•†J. F. Olney, M. S., D. V. M., *Instr. and Asst. in An. Path. and Hyg.*
•L. V. Skidmore, B. S., D. V. M., *Asst. Prof. An. Path.*

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•†Edna C. Noble, B. L., *Libr.*
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†S. B. Doten, M. A., *Dir. of Sta. Ext.*
‡C. W. Creel, B. S., *Dir. of Agr. Ext.*

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•‡V. E. Scott, B. S., *Prof. Dairying, Dairy and Poultry Specialist.*
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†Andrew Young, *Asst. in Range Mgt.*

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•H. P. Hagge, B. A., *Instr. Biol.*
•P. A. Lehenbauer, Ph. D., *Prof. Biol.*
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- †McKean Carter, A. B., *Asst. Chem.*
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Economics (Agr.):
- †F. B. Headley, *Chief Dept. of Farm Development.*
- †C. A. Brennen, B. S., *Range Econ.*
- †R. M. Clawson, B. S., *Asst. in Farm Development.*
- †Milton Howard, *Route Statistician.*
- †Matilda Marshall, *Asst. in Farm Development.*

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- *Louise K. Hammond, B. S., *Asst. Prof. Home Econ.*
- *Marjorie Ohman, B. S., *Asst. in Home Econ.*
- *Jessie P. Pope, M. S., *Asst. Prof. Home Econ.*

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- *L. W. Hartman, Ph. D., *Prof. Phys.*
- *G. B. Blair, A. M., *Assoc. Prof. Phys.*
- *S. W. Leifson, Ph. D., *Asst. Prof. Phys.*

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- †Edward Records, V. M. D., *Vet.*
- †L. R. Vawter, D. V. M., *Vet. Path.*

Miscellaneous:
- †Mrs. Martha Bruce, *Libr. and Secy.*

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- *†E. M. Gildow, D. V. M., M. S., *Asst. Prof. and Asst. Poultry Husb.*
- †E. W. Lang, B. S., *Asst. Poultry Tester.*
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- *†Walter Wisnicky, B. S., D. V. M., *Poultry Path.*

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- †T. O. Smith, M. S., *Assoc. Chem.*

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- *†J. M. Fuller, B. S., *Prof. Dairy Husb.; Dairy Husb.*
- *†H. F. DePew, B. S., *Asst. Prof. and Asst. Dairy Husb.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

Dairy Husbandry—Continued.
- •B. E. Huggins, *Instr. Dairy Husb.*
- ‡G. L. Waugh, B. S., *Agt. in Dairying.*

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- †M. F. Abell, Ph. D., *Asst. Agr. Econ.*
- ‡E. H. Rinear, M. S., *Asst. Agr. Econ.*

Editorial:
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- ‡K. E. Barraclough, B. S., *Ext. For.*
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- •Irma G. Bowen, B. S., *Instr. Household Arts.*
- †A. Gertrude Farr, B. S., *Lab. Asst. in Nutr.*
- •Mrs. Helen Leighton, *Instr. Home Econ.*
- •Carrie A. Lyford, M. A., *Asst. Prof. Home Econ.*
- ‡Louise Whitcomb, *Nutr. Specialist.*

Horticulture:
- •†G. F. Potter, M. S., *Prof. Hort.; Hort.*
- •†J. R. Hepler, M. S., *Asst. Prof. and Asst. Hort.*
- •‡L. P. Latimer, Ph. D., *Instr. and Asst. Hort.*
- •†James Macfarlane, *Instr. Flor.; Florist.*
- †‡H. A. Rollins, M. S., *Fruit Specialist.*
- •†S. W. Wentworth, B. S., *Asst. Prof. and Asst. Hort.*

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- •J. V. Adams, B. S., *Instr. Phys.*
- •C. W. Holmes, B. S., *Instr. Phys.*
- •Clement Moran, A. B., *Asst. Prof. Phys.*
- •R. R. Starke, A. M., *Instr. Phys.*

Zoology:
- •C. F. Jackson, M. S., *Prof. Zool.*
- •D. G. Barton, M. S., *Instr. Zool.*
- •Alma D. Jackson, M. A., *Asst. Prof. Zool.*
- •Edythe M. Tingley, M. S., *Instr. Zool.*
- •G. W. White, M. A., *Instr. Zool and Geol.*

Miscellaneous:
- •†W. P. Lewis, B. L. S., M. A., *Libr.*
- ††Elizabeth E. Mehaffey, *Asst. Libr.*

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- •†H. F. Huber, B. S., *Asst. Dir. of Sta. Actg. Secy. of Coll. of Agr.*
- ‡H. J. Baker, B. S., *Dir. of Ext. Work in Agr. and Home Econ.*

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- •T. J. Murray, M. S., *Prof. Bact.*
- •J. A. Anderson, Ph. D., *Instr. Bact.*

Botany and Plant Pathology:
- •†J. W. Shive, Ph. D., *Chief of Dlv. Prof. Plant Physiol.; Plant Physiol.*
- •†W. H. Martin, Ph. D., *Prof. Plant Path.; Plant Path.*
- •Mary E. C. Brumfield, M. S., *Instr. Bot.*
- •M. A. Chrysler, Ph. D., *Assoc. Prof. Bot.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal and poultry husbandry, etc.

[2] Courses given in College of Liberal Arts.

Botany and Plant Pathology—Contd.
†Elizabeth S. Clark, M. S., *Research Asst. in Plant Path.*
•Jessie G. Fiske, M. S., *Asst. Prof. Bot. and Physiol.*
•C. M. Haenseler, Ph. D., *Asst. Prof. Plant Path. and Mycol.*
†R. A. Ingalls, M. S., *Research Asst. in Plant Physiol.*
†A. C. Sessions, M. S., *Research Asst. in Plant Physiol.*

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Dairy Husbandry:
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•†C. B. Bender, M. S., *Asst. Prof. and Asst. Dairy Husb.*
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•Henry Keller, jr., M. S., *Assoc. Prof. Agr. Econ.*
†J. W. Carncross, M. S., *Research Asst. in Agr. Econ.*
•†C. B. Howe, M. A., *Asst. Prof. Agr. Econ.; Research Specialist in Mktg.*
‡W. F. Knowles, A. B., *Specialist in Agr. Econ.*
•D. T. Petruchuk, M. S., *Instr. Agr. Econ.*

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•D. B. Lucas, M. S., *Asst. Prof. Agr. Engin.*

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•†T. J. Headlee, Ph. D., *Prof. Ent.; Ent. (State Ent.).*
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•†C. C. Hamilton, M. S., *Assoc. Prof. and Assoc. Ent.*
†Augusta E. Meske, *Asst. Ent.*

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‡A. M. Hulbert, *Asst. Dir.*

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•†H. M. Biekart, B. S., *Assoc. in Ornamental Hort.*
•J. H. Clark, M. S., *Asst. Prof. Pomol.*
•C. H. Connors, B. S., *Asst. Prof. Flor.*
•‡A. J. Farley, B. S., *Prof. and Pomol. Specialist.*

[1] On leave.
[2] For subject-matter workers see the respective divisions, i. e., animal husbandry, bacteriology, etc.
[3] Courses given in the College for Women.

Horticulture—Continued.
†G. T. Nightingale, Ph. D., *Biochem. in Hort.*
‡C. H. Nissley, B. S., *Specialist in Veg. Gard.*
•W. R. Robbins, Ph. D., *Instr. Veg. Gard.*
•L. G. Schermerhorn, B. S., *Prof. Veg. Gard.*
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•George Winchester, Ph. D., *Prof. Phys.*
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•F. R. Pratt, Ph. D., *Prof. Phys.*

Poultry Husbandry:
•W. C. Thompson, B. S., *Prof. Poultry Husb.*
•F. R. Beaudette, D. V. M., *Assoc. Prof. Poultry Path.*
‡L. M. Black, B. S., *Specialist in Poultry Husb. (P. O., Vineland).*
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‡J. C. Taylor, B. S., *Assoc. Specialist in Poultry Husb.*

Soils and Crops.
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•†A. W. Blair, A. M., *Prof. Agr. Chem.; Soil Chem.*
‡H. R. Cox, M. S., *Specialist in Agron.*

Soils and Crops—Continued.
†R. A. Diehm, B. S., *Field and Lab. Asst. in Soils.*
†J. S. Joffe, Ph. D., *Research Asst. in Soils.*
†L. L. Lee, B. S., *Research Specialist in Land Utilization.*
†H. C. McLean, Ph. D., *Soil Bact.*
•†A. L. Prince, M. S., *Instr. and Asst. in Soil Chem.*
•H. W. Reuszer, B. S., *Instr. Agron.*
•H. B. Sprague, Ph. D., *Asst. Prof. Agron.*
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†Florence G. Tenney, B. S., *Research Asst. in Soil Microbiol.*
•†S. A. Waksman, Ph. D., *Assoc. Prof. Soil Microbiol.; Microbiol. and Soil Research.*

Zoology:
•T. C. Nelson, Ph. D., *Prof. Zool.*
•A. A. Boyden, Ph. D., *Asst. Prof. Zool.*
•[1] A. Hausman, Ph. D., *Assoc. Prof. Zool.*

Miscellaneous:
•G. A. Osborn, A. M., *Libr.*
‡A. S. Barnhart, B. S., *County Agt. at large.*
‡Mildred B. Murphey, B. S., *Home Dem. Agt. at large.*
•C. R. Woodward,[1] Ph. D., *Secy. of Coll.*

New Jersey State Agricultural Experiment Station, *New Brunswick*

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†W. C. Skelley, M. S., *Asst. An. Husb.*
†John Thompson, *Swine Herdsman.*

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†C. S. Cathcart, M. S., *Chem. (State Chem.).*
†F. S. Beckwith, B. S., *Fert. and Feed Sampler.*
†L. J. Faneuf, B. S., *Junior Chem.*
†Frank Groendyke, *Fert. and Feed Sampler.*
†L. R. Smith, B. S., *Asst. Chem.*
†A. C. Wark, *Asst. Chem.*
†R. L. Willis, B. S., *Asst. Chem.*

Dairy Husbandry:
†J. W. Bartlett, B. S., *Dairy Husb.*
†C. B. Bender, M. S., *Asst. Dairy Husb.*
†F. C. Button, B. S., *Asst. Dairy Husb.*
†W. R. Robbers, *Supt. Advanced Registry.*

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†A. G. Waller, M. S., *Agr. Econ.*
†J. W. Carncross, M. S., *Research Asst. in Agr. Econ.*
†D. T. Petruchuk, M. S., *Research Asst. in Agr. Econ.*

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†C. S. Beckwith, M. S., *Assoc. Ent. (P. O., Pemberton).*
†B. F. Driggers, Ph. D., *Asst. Ent.*

[1] On leave.

Entomology—Continued.
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†Ray Hutson, B. S., *Asst. Ent. in Apiculture.*
†Carl Ilg, *Lab. Asst.*
†Augusta E. Meske, *Asst. Ent.*
†F. W. Miller, *Asst. Ent.*

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†H. G. Bailey, *Veg. Gard. Foreman.*
†H. M. Biekart, B. S., *Assoc. in Ornamental Hort.*
†J. H. Clark, M. S., *Assoc. Pomol.*
†A. J. Farley, B. S., *Pomol.*
†G. T. Nightingale, Ph. D., *Biochem. in Hort.*
†W. R. Robbins, Ph. D., *Asst. in Oler.*
†L. G. Schermerhorn, B. S., *Oler.*
†C. H. Steelman, *Orchard Foreman.*
†H. O. Yates, jr., B. S., *Asst. in Ornamental Hort.*

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†J. C. Campbell, *Field Asst. in Plant Path.*
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†F. R. Beaudette, D. V. M., *Poultry Path.*
†J. J. Black, D. V. M., *Asst. Poultry Path. (P. O., Vineland).*
†E. Folwell, *Asst. Poultry Path.*
†C. B. Hudson, M. S., *Asst. Poultry Path.*
†O. N. Massengale, M. S., *Poultry Nutr.*
†C. S. Platt, M. S., *Asst. Poultry Husb.*
†Roy Richardson, *Foreman.*
†A. C. Schlott, *Foreman, Egg-Laying Contest (P. O., Westwood).*

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†Willis Sutter, *Foreman, Egg-Laying Contest (P. O., Vineland).*
†P. I. Tappen, *Insp. Trap Nesting.*

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†Sadie L. Boyce, *Asst. Seed Analyst.*
†Mary Brumfield, M. S., *Asst. Seed Analyst.*
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†H. Heukelekian, Ph. D., *Bact. in Sewage Invest.*
†I. O. Lacy, B. S., *Junior Chem. in Sewage Invest.*
†P. J. A. Zeller, S. B., *Junior Chem. in Sewage Invest.*

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†E. E. Evaul, M. S., *Research Asst. in Agron.*
†L. L. Lee, B. S., *Research Specialist in Land Utilization.*
†H. C. McLean, Ph. D., *Soil Bact.*
†A. L. Prince, M. S., *Asst. Soil Chem.*
†H. W. Reuszer, B. S., *Research Specialist in Agron.*
†H. B. Sprague, Ph. D., *Agron.*

Zoology:
†T. C. Nelson, Ph. D., *in charge Oyster Invest.*
†J. R. Nelson, B. S., *Oyster Research Specialist (P. O., Bivalve).*

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†Elizabeth G. Skillman, B. S., *Asst. Libr.*
†A. F. Stout, *Farm Mgr.*

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B. R. Fudge, M. S., *Physiol.*

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- •†L. B. Shires, M. S., *Asst. Prof. and Asst. Chem.*

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- ‡Veda Strong, B. S., *Asst. State Home Agt.*

Home Economics:[2]
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- •Hildure E. Anderson, M. S., *Asst. Prof. Home Econ.*

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- •J. W. Rigney, B. S., *Instr. Hort.*

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- •Cornelius Betten, Ph. D., D. Sc., *Dir. of Resident Instruction*
- •†‡Martha Van Rensselaer, A. B., and Flora Rose, M. A., *Directors, Coll. of Home Econ.*
- †F. B. Morrison, B. S., *Dir. of Sta.*
- ‡C. E. Ladd, Ph. D., *Dir. of Ext.*

Agronomy:
- •†‡T. L. Lyon, Ph. D., *Head of Dept. Prof. Soil Tech.*
- ‡J. H. Barron, B. S., *Ext. Prof. Field Crops.*
- •†J. A. Bizzell, Ph. D., *Prof. Soil Tech.*
- •H. O. Buckman, Ph. D., *Prof. Soil Tech.*
- •H. P. Cooper, Ph. D., *Asst. Prof. Field Crops.*

Agronomy—Continued.
- †W. T. Craig, *Asst. in Cereal Invest. (Coop. U. S. D. A.).*
- †Leah English, B. S., *Analyst in Agron.*
- •A. W. Gibson, B. S., *Instr. Farm Pract.*
- ‡A. F. Gustafson, Ph. D., *Ext. Prof. Soil Tech.*
- ‡H. B. Hartwig, M. S., *Ext. Asst. Prof. Agron.*

[1] For subject matter workers see the respective division, i. e., agronomy, animal industry, etc.

[2] Given in School of General Science.

[3] All members of the college faculty do experimental work as required.

Agronomy—Continued.

†F. B. Howe, M. S., *Soil Surveyor.*
•A. C. Kling, B. S. A., *Prof. Farm Pract. and Farm Superintendence.*
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•W. M. Phipps, M. S., *Chem. Analyst in Agron.*
•†B. D. Wilson, Ph. D., *Asst. Prof. Soil Tech.*
•†J. K. Wilson, Ph. D., *Prof. Soil Tech.*
•‡E. L. Worthen, M. S., *Ext. Prof. Soil Tech.*

Animal Husbandry:

•††H. H. Wing, M. S., *Prof. and Head of Dept.*
•C. L. Allen, Ph. D., *Asst. Prof. An. Husb.*
•R. C. Bender, M. S., *Instr. An. Husb.*
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•R. G. Maxwell, B. S., *Instr. An. Husb.*
•†L. A. Maynard, Ph. D., *Prof. An. Husb.*
‡H. J. Metzger, D. V. M., *Ext. Asst. Prof. An. Husb.*
•A. O. Rhoad, B. S., *Instr. An. Husb.*
•††E. S. Savage, Ph. D., *Prof. An. Husb.*
•C. D. Schutt, *Asst. An. Husb.*
‡G. W. Tailby, jr., B. S., *Ext. Instr. An. Husb.*
‡J. P. Willman, M. S., *Ext. Instr. An. Husb.*

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•P. R. Burkholder, A. B., *Instr. Bot.*
†S. H. Burnham, B. S., *Asst. Curator.*
•†O. F. Curtis, Ph. D., *Prof. Bot.*
•A. J. Eames, Ph. D., *Prof. Bot.*
•E. F. Hopkins, Ph. D., *Asst. Prof. Bot.*
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•Barbara McClintock, Ph. D., *Instr. Bot.*
•W. C. Muenscher, Ph. D., *Asst. Prof. Econ. Bot.*
•L. C. Petry, Ph. D., *Prof. Bot.*
†Donald Reddick, Ph. D., *Prof. Plant Path.*
•†L. W. Sharp, Ph. D., *Prof. Bot.*

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•†G. W. Cavanaugh, B. S., *Prof. Agr. Chem.*

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•††J. M. Sherman, Ph. D., *Prof. and Head of Dept.*
‡W. E. Ayres, *Ext. Asst. Prof. Dairy Indus.*
‡J. D. Brew, M. S., *Ext. Prof. Dairy Indus.*
•†W. W. Fisk,[1] M. S., *Prof. Dairy Indus.*
•†E. S. Guthrie, Ph. D., *Prof. Dairy Indus.*
•G. A. Knaysi, M. S., *Instr. Bact.*
•†T. J. Mclnerney, M. S., *Asst. Prof. Dairy Indus.*
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•Randall Whitaker, Ph. D., *Instr. Dairy Indus.*

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•Clara L. Garrett, B. S., *Asst. Prof. Drawing.*
•J. E. Reyna, E. E., M. A., *Asst. Prof. Drawing.*

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•H. B. Boyd, B. S., *Instr. Mktg.*
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‡I. F. Hall, Ph. D., *Ext. Asst. Prof. Farm Mgt.*
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•†G. N. Lauman, B. S., *Prof. Agr. Econ.; Rural Econ.*
‡John Marshall, jr., B. S., *Ext. Instr. Farm Mgt.*
•W. G. Meal, B. S., *Instr. Mktg.*

[1] On leave.

Economics (Agr.)—Continued.
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•†W. I. Myers, Ph. D., *Prof. Farm Finance; Farm Mgt.*
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‡H. N. Young, B. S., *Ext. Instr. Farm Mgt.*

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‡B. A. Jennings, B. S., *Ext. Asst. Prof. Rural Engin.*
•J. C. McCurdy, B. S., C. E., *Prof. Rural Engin.*

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•L. M. Roehl, B. S., *Asst. Prof Farm Shop.*
•F. R. Wright, M. S., *Instr. Rural Engin.*

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‡P. J. Chapman, B. S., *Ext. Instr. Ent.*
•†P. W. Chassen, Ph. D., *Prof. Biol.*
†‡C. R. Crosby, A. B., *Ext. Prof. Ent.*
•N. L. Cutler, M. S., *Instr. Ent.*
•†G. C. Embody, Ph. D., *Prof. Aquiculture.*
•W. T. M. Forbes, Ph. D., *Instr. Ent.*
•Grace H. Griswold, Ph. D., *Instr. Ent.*
•†G. W. Herrick, B. S., *Prof. Econ. Ent.; Ent.*
•†O. A. Johannsen, Ph. D., *Prof. Ent.; Gen. Biol.*
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‡Montgomery Robinson, Litt. B., B. S., *Prof. in Ext. Teaching.*
‡L. R. Simons, B. S., *Asst County Agt. Leader.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

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‡Mildred M. Stevens, B. S., *Asst. State Leader Junior Ext.*

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*S. N. Spring, B. A., M. F., *Prof. Silviculture.*

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*††Flora Rose, M. A., *Dir. of Coll.*

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*Beulah Blackmore, B. S., *Prof. Home Econ.*

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*Sannie Callan, M. A., *Instr. Home Econ.*

††Helen Canon, B. S., *Ext. Instr. and Asst. in Home Econ.*

‡Mildred Carney, M. A., *Acty. Ext. Asst. Prof. Home Econ.*

‡Mary E. Cushman, B. S., *Ext. Instr. Home Econ.*

*Mrs. Dora W. Erway, *Asst. Prof. Home Econ.*

*Faith Fenton, M. S., *Asst. Prof. Home Econ.*

*Dorothy I. Fessenden, B. S., *Instr. Home Econ. and Asst. Mgr. Cafeteria.*

[1] On leave.

Home Economics—Continued.

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*Katherine W. Harris, B. S., *Instr. Home Econ. and Mgr. Cafeteria.*

*Mary F. Henry, M. A., *Prof. Home Econ.*

*Marion S. Hillhouse, B. A., *Instr. Home Econ.*

*F. Beatrice Hunter,[1] B. S., *Prof. Home Econ.*

‡Jennie C. Jones, *Ext. Instr. Home Econ.*

‡Helen B. Kay, M. A., *Ext. Asst. Prof. Home Econ.*

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*Elizabeth V. D. Lacey, M. A., *Asst. Prof. Home Econ.*

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*†Edith H. MacArthur, Ph. D., *Asst. Prof. Home Econ.*

‡Mrs. Nancy K. Masterman, A. B., *Ext. Instr. Home Econ.*

*H. B. Meek, M. A., *Prof. Hotel Mgt.*

*Helen Monsch, M. A., *Prof. Home Econ.*

‡Grace E. Morin, M. A., *Ext. Asst. Prof. Home Econ.*

‡Caroline Morton, M. A., *Ext. Asst. Prof. Home Econ.*

*Edith H. Nason, Ph. D., *Asst. Prof. Home Econ.*

‡Claribel Nye,[1] B. S., *Ext. Prof. Home Econ. and Assoc. State Leader Home Dem. Agts.*

*Katharine Reeves, B. A., *Instr. Home Econ.*

*Myra J. Robinson, A. B., *Acty. Asst. Prof. Home Econ.*

‡Mrs. Nancy M. Roman, Ph. B., *Ext. Prof. Home Econ.*

*Rachel Sanders, B. S., *Asst. in Home Econ.*

*Ruth J. Scott, B. S., *Asst. Prof. Home Econ.*

*Jean Simpson, M. S., *Instr. Home Econ.*

‡Dora F. Sommerday, Ph. B., *Ext. Asst. Prof. Home Econ.*

‡Hazel L. Spencer, M. A., *Ext. Asst. Prof. Home Econ.*

*†Adelaide Spohn, Ph. D., *Prof. Home Econ.*

‡Helen M. Taylor, B. S., *Ext. Instr. Home Econ.*

*Mrs. Ethel B. Waring, Ph. D., *Prof. Home Econ.*

*Annette J. Warner, *Prof. Home Econ.*

*Charlotte E. Weiss, *Asst. Prof. Home Econ.*

Home Economics—Continued.
‡Marguerite Wilker, Ph. D., *Ext. Prof. Home Econ.*
•†Faith M. Williams, Ph. D., *Asst. Prof. Home Econ.*

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•†‡H. C. Thompson, Ph. D., *Prof. and Head Dept. of Veg. Gard.*
•†‡A. J. Heinicke, Ph. D., *Prof. and Head Dept. of Pomol.*
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•†D. B. Carrick, Ph. D., *Prof. Pomol.*
•‡R. W. Curtis, M. S., *Prof. Ornamental Hort.*
•E. G. Davis, B. S., *Prof. Landsc. Arch.*
•R. B. Farnham, B. S., *Instr. Flor.*
•†‡E. V. Hardenburg,[1] Ph. D., *Prof. Veg. Gard.*
•C. J. Hudson, jr., B. S., *Instr. Flor.*
•C. J. Hunn, B. S., *Asst. Prof. Ornamental Hort.*
•†L. H. MacDaniels, Ph. D., *Prof. Pomol.*
•H. S. Mills, M. S., *Instr. Veg. Gard. (P. O., Riverhead).*
•Lua A. Minns, M. S., *Instr. Flor.*
‡Joseph Oskamp, B. S., *Ext. Prof. Pomol.*
‡G. W. Peck, M. S., *Ext. Prof. Pomol.*
‡J. P. Porter, M. S., M. L. D., *Ext. Asst. Prof. Ornamental Hort.*
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•H. W. Schneck, M. S., *Asst. Prof. Veg. Gard.*
‡F. O. Underwood, B. S., *Ext. Asst. Prof. Veg. Gard.*
†P. H. Wessels, M. S., *Research Prof. Veg. Gard. (P. O., Riverhead).*
•†Paul Work, Ph. D., *Prof. Veg. Gard.*

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•F. P. Bussell, Ph. D., *Prof. Plant Brdg.*
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‡J. R. Livermore, B. S., *Ext. Instr. Plant Brdg.*
•†H. H. Love, Ph. D., *Prof. Plant Brdg.*
†A. T. Lyon, *Asst. in Plant Brdg. Invest.*

[1] On leave.

Plant Breeding—Continued.
•†‡C. H. Myers, Ph. D., *Prof. Plant Brdg.*
•†R. G. Wiggans, Ph. D., *Asst. Prof. Plant Brdg.*

Plant Pathology:
•†‡L. M. Massey, Ph. D., *Prof. and Head of Dept.*
†‡M. F. Barrus,[1] Ph. D., *Ext. Prof. Plant Path.*
•†F. M. Blodgett,, Ph. D., *Asst. Prof. Plant Path.*
•†W. H. Burkholder, Ph. D., *Prof. Plant Path.*
‡C. D. Chupp, Ph. D., *Ext. Prof. Plant Path.*
‡K. H. Fernow, Ph. D., *Ext. Asst. Prof. Plant Path.*
•†H. M. Fitzpatrick, Ph. D., *Prof. Plant Path.*
•J. E. Flynn, M. S., *Instr. Plant Path.*
‡W. D. Mills, M. S., *Ext. Instr. Plant Path.*
•J. W. Sinden, A. B., *Instr. Plant Path.*
•Dewey Stewart, M. S., *Instr. Plant Path.*
•H. E. Thomas, Ph. D., *Asst. Prof. Plant Path.*
•D. S. Welch, Ph. D., *Asst. Prof. Plant Path.*
•†H. H. Whetzel, D. Sc., *Prof. Plant Path.*

Poultry Husbandry:
•†‡J. E. Rice, B. S., *Prof. and Head of Dept.*
‡H. E. Botsford, B. S., *Ext. Prof. Poultry Husb.*
•G. O. Hall, Ph. D., *Asst Prof. Poultry Husb.*
•†G. F. Heuser, Ph. D., *Prof. Poultry Husb.*
‡L. M. Hurd, *Ext. Instr. Poultry Husb.*
•J. C. Huttar, B. S., *Instr. Poultry Husb.*
‡W. G. Krum, *Ext. Instr. Poultry Husb.*
•D. R. Marble, B. S., *Instr. Poultry Husb.*
•L. C. Norris, Ph. D., *Asst. Prof. Poultry Husb.*
‡R. C. Ogle, *Ext. Instr. Poultry Husb.*
•C. K. Powell, Ph. D., *Asst. Prof. Poultry Husb.*
‡L. E. Weaver, B. S., *Ext. Asst. Prof. Poultry Husb.*

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‡G. S. Butts, B. S., *Supvr. Farm Study Courses.*
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Publication—Continued.
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‡Nellie B. Leonard, B. A., *Asst. Editor of Pubs.*

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‡Mary E. Duthie, B. S., *Ext. Instr. Rural Social Organ.*
‡R. A. Felton, Ph. B., M. A., *Ext. Prof. Rural Social Organ.*
*B. L. Melvin, Ph. D., *Actg. Prof. Rural Social Organ.*
*R. W. Nafe, Ph. D., *Asst. Prof. Rural Social Organ.*

Zoology:
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*††A. A. Allen, Ph. D., *Prof. Ornith.*
*P. P. Bably, Ph. D., *Assoc. Curator Invertebrate Zool.*
*R. P. Hunter, A. M., *Instr. Zool.*
*Eleanor C. McMullen, A. M., *Instr. Zool.*
*Amy G. Mekeel, A. M., *Instr. Zool.*
*Lillian A. Phelps, M. A., *Instr. Zool.*
*M. D. Pirnie, B. S., *Instr. Ornith.*
*A. H. Wright, Ph. D., *Prof. Zool.*
*B. P. Young, Ph. D., *Asst. Prof. Zool.*

New York State Agricultural Experiment Station, *Geneva*

†Station staff

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†G. W. Churchill, *Agr.*
†J. D. Harlan, B. S., *Asst. in Research (Agron.).*
†J. E. Mensching, M. S., *Assoc. in Research (Agron.).*
†P. V. Traphagen, *Asst. in Research (Agron.).*

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†J. C. Marquardt, M. S., *Asst. in Research (Dairying).*
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†H. J. Conn, Ph. D., *Chief in Research (Soil Bact.).*
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†C. S. Pederson, M. S., *Asst. in Research (Bact.).*
†P. S. Prickett, M. S., *Asst. in Research (Bact.).*

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†F. C. Stewart, M. S., *Chief in Research (Bot.).*
†E. E. Clayton, Ph. D., *Assoc. in Research (Plant Path.: P. O., Riverhead, L. I.).*
†W. O. Gloyer, M. A., *Assoc. in Research (Bot.).*
†Olive M. Hoefle, B. S., *Asst. in Research (Bot.).*
†L. K. Jones, Ph. D., *Assoc. in Research (Plant Path.).*

Botany—Continued.
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†W. H. Rankin, Ph. D., *Assoc. in Research (Plant Path.).*
†E. V. Shear, jr., M. S., *Assoc. in Research (Plant Path.: P. O., Poughkeepsie).*
†Mary E. Woodbridge, M. S., *Asst. in Research (Bot.).*

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†L. L. Van Slyke, Ph. D., *Chief in Research (Chem.).*
†D. C. Carpenter,[1] Ph. D., *Assoc. in Research (Chem.).*
†A. W. Clark, B. S., *Assoc. in Research (Chem.).*
†F. J. Kokoski, B. S., *Asst. in Research (Chem.).*
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†S. W. Harman, M. S., *Asst. in Research (Ent.).*
†F. Z. Hartzell, M. A., *Assoc. in Research (Ent.).*

[1] On leave.

Entomology—Continued.
†H. C. Huckett, Ph. D., *Assoc. in Research (Ent.: P. O., Riverhead, L. I.).*
†F. G. Mundinger, M. S., *Assoc. in Research (Ent.: P. O., Poughkeepsie).*

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†U. P. Hedrick, D. Sc., *Chief in Research (Hort.), Vice Dir. of Sta.*
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†F. H. Hall, B. S., *Assoc. in Research (Hort.).*
†L. R. Hawthorn, B. S., *Asst. in Research (Hort.).*

Horticulture—Continued.
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†C. B. Sayre, M. S., *Assoc. in Research (Hort.).*
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†G. P. Van Eseltine, *Assoc. in Research (Hort.).*
†Richard Wellington, M. S., *Assoc. in Research (Hort.).*

Miscellaneous:
†Viola Elver, *Libr.*
†J. S. Lawson, *Museum Preparator.*

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*‡I. O. Schaub, B. S., *Dean School of Agr., Dir. of Ext. Service*
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*†‡C. B. Williams, M. S., *Head of Dept.*
†S. R. Bacon, B. S., *Asst. in Soil Survey.*
†F. O. Bartel, C. E., *Drainage Engin.*[1] *(Coop. U. S. D. A.).*
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†A. S. Cline, B. S., *Asst. in Soil Fert. Invest.*
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‡A. T. Holman, B. S., *Farm Engin. Specialist.*
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†P. H. Kime, M. S., M. Agr., *Assoc. in Plant Brdg.*
‡S. J. Kirby, M. S., *Agron. Specialist.*
†H. B. Munn, M. S., *Asst. in Fert. Invest.*
†J. H. Moore, M. S., *Cotton Tech.*
†S. O. Perkins, *Asst. in Soil Survey (Coop. U. S. D. A.).*

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*‡D. S. Weaver, M. S., *Assoc. Prof. Agr. Engin.*
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‡W. V. Hays, *Asst. Swine Specialist.*
*E. H. Hostetler, M. Agr., *Prof. An. Husb.; in charge Swine Invest.*
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[1] Under jurisdiction of the commissioner of agriculture (*post office, Raleigh*), cooperating with the station in research.

Animal Industry—Continued.

†C. D. Schliffman, B. S., *Asst. in An. Nutr.*

‡W. W. Shay, *Swine Husb. Specialist.*

†F. W. Sherwood, Ph. D., *Assoc. in An. Nutr.*

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††A. O. Alford, *Asst. Editor.*

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•L. E. Cook, M. S., *Prof. Voc. Ed.*

•W. L. Mayer, B. S., *Assoc. Prof. Voc. Ed.*

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‡C. R. Hudson, M. S., *State Agt. in charge Negro Work.*

‡Maude E. Wallace, *Asst. State Home Dem. Agt.*

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‡R. W. Graeber, B. S., *For. Specialist.*

Home Economics:

‡Helen Estabrook, B. S., *Clothing and Home Decoration Specialist.*

‡Mary E. Thomas, B. S., *Nutr. Specialist.*

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•†C. D. Matthews, B. S., *Head of Dept.*

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‡H. R. Niswonger, M. A., *Hort. Specialist.*

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†Robert Schmidt, B. S., *Asst. Hort.*

†C. B. Wiggans, M. S., *Research Asst. Hort.*

†C. F. Williams, M. S., *Asst. Hort.*

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Poultry Husbandry:

•†B. F. Kaupp, M. S., D. V. S., *Head of Dept. and Avian Path.*

•W. F. Armstrong, M. S., *Assoc. Prof. Poultry Husb.*

†W. G. Crowder, *Poultryman.*

•†R. S. Dearstyne, M. S., *Assoc. Prof. and Assoc. in Poultry Invest. and Path.*

‡A. G. Oliver, M. Agr., C. E., *Poultry Specialist.*

‡C. F. Parrish, B. S., *Asst. Poultry Specialist.*

•H. S. Wilfong, B. S., *Lab. Asst. in Poultry Diseases.*

•N. W. Williams, B. S., *Poultryman.*

Zoology and Entomology:

•†Z. P. Metcalf, D. Sc., *Head of Dept.*

‡C. H. Brannon, B. S., *Asst. Ent. Specialist.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

Zoology and Entomology—Continued.
†C. S. Brimley, *Asst. Ent.*[1]
†J. C. Crawford, M. S., *Asst. Ent.*[1]
†Elizabeth Haban, *Lab. Asst.*
†J. A. Harris, B. S., *Asst. Ent.*[1]
†R. W. Leiby, Ph. D., *Ent.*[1]
•F. B. Meacham, M. S., *Asst. Prof. Zool. and Ent.*
•T. B. Mitchell, M. S., *Asst. Prof. Zool. and Ent.*
‡C. L. Sams, *Beekeeping Specialist.*
•L. H. Snyder, Sc. D., *Assoc. Prof. Zool.*

Miscellaneous:
•Frank Capps, *Acty. Libr.*
•†R. J. Harris, *Supt. of Farms.*
•Mrs. Charlotte M. Williamson, *Asst. Libr.*

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Blackland Branch Sta., *P. O. Wenona*—
J. L. Rea, jr., B. S., *Asst. Dir.*
A. P. Lefevers, *Swine Herdsman.*

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L. O. Page, *Swine Herdsman.*

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•Agricultural faculty. ‡Extension staff

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•B. H. Crutcher, B. S., *Prof. Dairying and Bact.*
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†S. B. Simmons, B. S., *Voc. Supvr. and Itinerant Teacher Trainer.*

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North Dakota Agricultural College and the Agricultural Experiment Station, *State College Station, Fargo* (freight and express address, *Fargo*)

•College faculty. †Station staff. ‡Extension staff

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•†H. L. Walster, Ph. D., *Dean School of Agr.*
•†P. F. Trowbridge, Ph. D., *Dir. of Sta. Prof. Research Methods*
‡C. F. Monroe, M. Agr., *Dir. of Agr. Ext.*

Agronomy:
Dean Walster, *Chair. of Dept. Prof. Agron. and Soils.*
•O. O. Churchill, Ph. D., *Prof. Agron. (Farm Crops).*
‡E. G. Booth, M. S., *Field Agt. in Agron.*
•†J. E. Chapman, M. S., *Asst. Prof. and Asst. in Soils.*
†E. I. Olsen, B. S., *Asst. Agron. (Flax Invest.) and Supt. Dem. Farms.*
†P. J. Olson, M. S., *Asst. Agron.*

Agronomy—Continued.
†Thomas Sanderson, *Miller*
†T. E. Stoa, M. S., *Asst. Agron.*
†L. R. Waldron, M. A., *Agron. (Plant Brdg.).*

Animal Husbandry:
‡J. H. Shepperd, M. S., *Chair. of Dept.*
•†E. J. Thompson, B. S., *Prof. An. Husb.; An. Husb.*
‡G. J. Baker, M. S., *Field Agt. in Livestock*

[1] Under jurisdiction of the commissioner of agriculture (*post office, Raleigh*) cooperating with the station in research
[2] Under the State department of agriculture and agricultural experiment station.

Animal Husbandry—Continued.

•†O. A. Barton, B. S., *Prof. Poultry Husb.; Poultryman.*
•†F. W. Christensen, M. S., *Prof. An. Nutr.; An. Nutr. Asst. Chair. of Dept.*
•†D. J. Griswold, jr., A. M., *Acting. Asst. Prof. and An. Husb.*
†M. B. Johnson, *Ranch Cattle Invest. (Coop. U. S. D. A.: P. O., Spearfish, S. D.).*
•†H. M. Scott, M. S., *Instr. and Research Asst. in Poultry Husb.*
•†A. S. Severson, M. S., *Asst. Prof. and An. Husb.*
‡O. J. Welsner, B. S., *Field Agt. in Poultry Husb.*

Botany, Bacteriology, and Zoology:

†H. L. Bolley, M. S., *Bot. and Pure Seed Comr.*
†L. W. Boyle, M. S., *Asst. Plant Path. (Coop. U. S. D. A.).*
†W. E. Brentzel, M. A., *Plant Path.*
†W. G. Couey, B. S., *Potato Specialist.*
•†Mayme Dworak, A. M., *Asst. Prof. Bot. and Bact.; Bact. and Plant Physiol.*
†Astri Frisak, *Seed Analyst.*
•G. J. Ikenberry, M. S., *Assoc. Prof. Bot.*
•Eunice L. Kingsley, B. S., *Instr. Bot.*
†H. D. Long, *Field Crop Insp.*
‡G. C. Mayoue, M. S., *Field Agt. in Plant Path.*
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•G. V. Wilby, M. A., *Instr. Zool. and Physiol.*

Chemistry:

•W. T. Pearce,[1] Ph. D., *Dean School of Chem.*
†T. H. Hopper, M. A., *Chair. of Agr. Chem. Dept.*
•A. C. Beckel, M. S., *Instr. Chem.*
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[1] Post office for staff, *Columbus*, unless otherwise stated.

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- •Ethel E. Davis, M. A., *Prof. and Head Dept. of Household Arts.*

[1] On leave.

[2] For subject-matter workers see the respective division, i. e., animal husbandry, botany and plant pathology, etc.

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[2] For subject-matter workers see the respective division, i. e., animal husbandry, bacteriology, etc

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The School of Agriculture and Agricultural Experiment Station and the Departments of Home Economics and Rural Education of the Pennsylvania State College,[1] *State College*

*College faculty. †Station staff. ‡Extension staff

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*†R. L. Watts, D. Agr., *Dean School of Agr., Dir. of Sta.*
‡M. S. McDowell, M. S., *Vice Dean and Dir. of Agr. Ext.*

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*†C. O. Cromer, B. S., *Prof. Farm Crops.*
*†C. F. Noll, Ph. D., *Prof. Expt. Agron. and Supt. of Farms.*
*†J. W. White, M. S., *Prof. Soil Tech.*
*†J. S. Cobb, M. S., *Asst. Prof. Agron.*
*‡J. B. R. Dickey, B. S., *Asst. Prof. Agron. Ext.*
*†F. J. Holben, M. S., *Asst. Prof. Soil Tech.*
*†C. J. Irvin, B. S., *Instr. Expt. Agron.*
*†C. D. Jeffries, M. S., *Asst. Prof. Soil Tech.*
*†F. G. Merkle, M. S., *Assoc. Prof. Soil Tech.*
*‡H. B. Musser, B. S., *Asst. Prof. Agron. Ext.*
*†A. L. Patrick, M. S., *Prof. Soil Tech.*
*†Nickolas Schmitz, B. S., *Prof. Agron. Ext.*

Animal Husbandry:
*†F. L. Bentley, M. S., *Head of Dept.*
*†M. F. Grimes, M. S., *Prof. An. Husb.*
*‡W. B. Connell, M. S., *Assoc. Prof. An. Husb. Ext.* (*Sheep*).
*‡H. H. Havner, D. V. M., M. S., *Prof. An. Husb. Ext.*

Animal Husbandry—Continued.
*†W. L. Henning, M. S., *Asst. Prof. An. Husb.*
*‡P. C. MacKenzie, *Asst. in An. Husb.*
*‡L. C. Madison, B. S., *Asst. Prof. An. Husb. Ext.* (*Swine*).
*†J. F. Shigley, D. V. M., *Assoc. Prof. Vet. Sci.*
*‡J. M. Vial, B. S., *Asst. Prof. An. Husb. Ext.*
*†P. T. Ziegler, M. S., *Asst. Prof. An. Husb.*

Botany:
*†F. D. Kern, Ph. D., D. Sc., *Head of Dept.*
*†W. S. Beach, Ph. D., *Assoc. Prof. Plant Path. Research* (*P. O., Bustleton*).
*†J. B. Hill, Ph. D., *Prof. Bot.*
*†J. P. Kelly, Sc. D., *Prof. Bot.*
*‡R. S. Kirby, Ph. D., *Asst. Prof. Plant Path. Ext.*
*‡W. S. Krout, M. A., *Assoc. Prof. Plant Path. Ext.*
*†E. L. Nixon, M. S., *Prof. Plant Path.*
*†C. R. Orton,[2] Ph. D., *Prof. Plant Path.*
*†L. O. Overholts, Ph. D., *Prof. Bot.*
*†H. W. Popp, Ph. D., *Asst. Prof. Bot.*

[1] This institution gives the academic title to all employees. [2] On leave.

Botany—Continued.
- *†H. W. Thurston, jr., Ph. D., *Asst. Prof. Plant Path.*
- *†H. A. Wahl, B. S., *Instr. Bot.*

Chemistry (Agr. and Biol.):
- *†R. A. Dutcher, M. S., *Head of Dept.*
- *†D. E. Haley, Ph. D., *Prof. Soil and Phytochem.*
- *†A. K. Anderson, Ph. D., *Assoc. Prof. Physiol. Chem.*
- *†E. S. Erb, M. S., *Assoc. Prof. in charge Analyses; Mct.*
- *†Hannah E. Honeywell, Ph. D., *Asst. Prof. Biol. Chem.*
- *†M. W. Lisse, M. S., *Assoc. Prof. Biophys. Chem.*
- *†R. J. Miller, D. Sc., *Assoc. Prof. Agr. and Biol. Chem.; Research in Poultry Nutr.*
- *†H. B. Pierce, M. S., *Assoc. Prof. Food and Dairy Chem.*
- *†E. S. Reider, Phar. G., *Instr. Agr. Chem.*
- *†Walter Thomas, B. S., *Assoc. Research Prof. Phytochem.*
- *†H. O. Triebold, M. S., *Instr. Agr. and Biol. Chem.*

Dairy Husbandry and Bacteriology:
- *†A. A. Borland, M. S., *Head of Dept.*
- *†A. L. Beam, M. S., *Prof. Dairy Prod.*
- *†S. I. Bechdel, Ph. D., *Prof. Dairy Prod.*
- *‡S. J. Brownell, B. S., M. Agr., *Asst. Prof. Dairy Husb. Ext.*
- *†C. D. Dahle, M. S., *Assoc. Prof. Dairy Mfrs.*
- *†F. J. Doan, M. S., *Asst. Prof. Dairy Mfrs.*
- *‡E. B. Fitts, B. S., *Prof. Dairy Husb. Ext.*
- *‡C. R. Gearhart, B. S., *Asst. Prof. Dairy Husb. Ext.*
- *†P. D. Jones, *Asst. in Dairy Husb.*
- *†F. P. Knoll, *Asst. in Dairy Mfrs.*
- *†M. H. Knutsen, M. S., *Assoc. Prof. Bact.*
- *‡R. H. Olmstead, M. S., *Asst. Prof. Dairy Husb. Ext.*
- *‡I. O. Sidelmann, *Asst. in Dairy Husb. Ext.*
- *†W. D. Swope, M. S., *Assoc. Prof. Dairy Husb.*
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- *‡R. R. Welch, M. S., *Asst. Prof. Dairy Husb. Ext.*
- *†P. S. Williams, M. S., *Assoc. Prof. Dairy Husb.*

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- *†W. V. Dennis, A. B., *Prof. Rural Sociol.*

Economics (Agr.)—Continued.
- *‡M. J. Armes, B. S., *Asst. in Farm Mgt. Ext.*
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- *†P. I. Wrigley, B. S., *Instr. Agr. Econ.*

Editorial:
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Entomology—*See* **Zoology.**

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- *‡W. R. White, M. S., *Assoc. Prof. Agr. Ed.*

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- *†G. M. Foulkrod, B. S., *Asst. Prof. Farm Mach.*
- *†J. R. Haswell, C. E., *Asst. Prof. Farm Mech. Ext.*
- *†H. B. Josephson, M. S., *Asst. Prof. Farm Mach.*

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- *‡C. R. Anderson, B. S., M. F., *Prof. For. Ext.*
- *†W. G. Edwards, M. S., *Prof. Lumbering.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

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*†A. C. McIntyre, B. S., *Instr. For. Research.*

*‡F. T. Murphey, B. S., *Asst. Prof. For. Ext.*

*†H. S. Newins, M. F., *Prof. Wood Utilization.*

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*Jean D. Amberson, M. A., *Asst. Prof. Home Econ. Ed.*

*‡Madge T. Bogart, B. S., *Prof. Home Econ. Ext.*

*Anne E. Boyd, B. S., *Asst. Prof. Home Econ.*

*‡Margaret Brown, B. S., *Asst. Prof. Home Econ. Ext.*

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*E. Gladys Flippo, M. S., *Instr. Home Econ.*

*Ruth E. Graham, M. S., *Assoc. Prof. Home Econ.*

*‡Belle Hubbard, *Instr. Home Econ. Ext.*

*Emily M. McCoy, R. N., *Instr. Home Nursing.*

*Louise B. Moss, M. A., *Assoc. Prof. Home Econ.*

*Mabel E. Moss, M. A., *Instr. Home Econ.*

*Phyllis K. Sprague, M. S., *Asst. Prof. Home Econ.*

*Louise G. Turner, M. A., *Assoc. Prof. Home Econ. Ed.*

*N. Maude Vedder, B. S., *Asst. Prof. Home Econ.*

*M. Elizabeth Westgate, M. A., *Asst. Prof. Home Econ.*

*Sarah M. Wilson, M. A., *Assoc. Prof. Home Econ. Ed.*

Horticulture:

*†S. W. Fletcher, Ph. D., *Head of Dept.*

*†R. D. Anthony, Ph. D., *Prof. Pomol.*

*†F. N. Fagan, M. S., *Prof. Pomol.*

*†J. E. Knott, Ph. D., *Prof. Veg. Gard.*

*†C. E. Myers, Ph. D., *Prof. Plant Brdg.*

*†E. I. Wilde,[1] M. S., *Prof. Flor.*

*†L. B. Arrington, B. S., *Instr. Flor.*

*‡J. R. Bracken, B. S., *Prof. Landsc. Arch.*

*†R. W. Evans, B. S., *Instr. Hort.*

*†F. W. Haller, *Asst. in Hort.*

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*‡J. M. Huffington, B. S., *Asst. Prof. Veg. Gard. Ext.*

*‡Emil Kant, B. S., *Instr. Landsc. Gard. Ext.*

*†M. T. Lewis, M. S., *Instr. Plant Brdg.*

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*‡W. B. Nissley, B. S., *Prof. Veg. Gard. Ext.*

*‡R. S. Snyder, M. S., *Asst. in Pomol. Ext.*

*†C. A. M. Sorg, B. S., *Asst. Prof. Ornamental Hort.*

*†R. H. Sudds, M. S., *Instr. Pomol.*

*‡Paul Thayer, M. S., *Prof. Pomol. Ext.*

Poultry Husbandry:

*†H. C. Knandel, B. S., *Head of Dept.*

*†E. W. Callenbach, B. S., *Instr. Poultry Husb.*

*†T. B. Charles, B. S., *Assoc. Prof. Poultry Husb.*

*‡C. O. Dossin, M. S., *Asst. Prof. Poultry Husb. Ext.*

*‡H. H. Kauffman, B. S., *Instr. Poultry Husb. Ext.*

*‡H. D. Munroe, B. S., *Prof. Poultry Husb. Ext.*

*‡John Vandervort, B. S., *Asst. Prof. Poultry Husb. Ext.*

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*†E. H. Dusham, Ph. D., *Head of Dept.*

*‡E. J. Anderson, M. S., *Instr. Ent. Ext.*

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*‡F. W. Petty, Ph. D., *Asst. Prof. Ent. Ext.*

*†C. A. Thomas, B. S., *Asst. Prof. Econ. Ent. (P. O., Bustleton).*

*†H. M. Tietz, M. S., *Instr. Zool.*

*†H. N. Worthley, M. S., *Asst. Prof. Econ. Ent.*

Miscellaneous:

*†C. W. Smith, B. S., *Asst. in Photog.*

*†Kathryne M. Stanford, *Agr. Libr.*

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†Institute staff

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†C. V. Smythe, A. B., *Asst. in An. Nutr.*

†R. W. Swift, M. S., *Assoc. in An. Nutr.*

†H. H. Williams, *Asst. in An. Nutr.*

[1] On leave.

PORTO RICO

College of Agriculture of the University of Porto Rico, *Mayaguez*

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•A. A. Álvarez, V. M. D., *Prof. Vet. Sci.*
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•A. S. Muller, B. S., *Asst. Prof. Bot. and Plant Path.*
•C. H. Spiegelberg, B. S., *Instr. Hort.*
•H. G. Wagner, M. A., *Prof. Econ.*

Agricultural Experiment Station, *Mayaguez*

Under supervision of the Office of Experiment Stations, United States Department of Agriculture

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†H. C. Henricksen, B. Agr., *Agr.*
†T. B. McClelland, A. B., *Hort.*
†C. M. Tucker, B. S., *Plant Path.*
†H. L. Van Volkenberg, D. V. M., M. S., *Assoc. Parasitol.*
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†A. Arroyo, *Ent. Preparator.*

Insular Experiment Station, *Rio Piedras*

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†R. F. García, B. S., *Chief Div. Chem.*
†Pedro Richardson, B. S., *Chief Div. Agron.*
†J. V. Catalá, D. V. S., *Vet.*
†Ismael Colón, B. S., *Assoc. Chem.*
†V. C. Frías, B. S., *Asst. Chem.*
†J. A. B. Nolla, M. S., *Asst. Plant Path.*
†Pedro Osuna, B. S., *Hort.*
†J. H. Ramírez, B. S., *Asst. Chem.*
†Francisco Sein, jr., B. S., *Asst. Ent.*
†L. A. Serrano, B. S., *Asst. Agron.*
†F. A. Villamil, B. S., *Asst. Chem.*

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†B. E. Gilbert, Ph. D., *Act. Dir. of Sta.*
•‡G. E. Adams, B. S., M. Agr., *Dean of Agr. and Dir. of Ext. Service*

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Dean Adams, *Prof. Agron.*
†B. L. Hartwell, Ph. D., *Agron.*
†F. K. Crandall, B. S., *Asst. in Field Expts.*
†S. C. Damon, B. S., *Asst. in Field Expts.*
•‡L. A. Keegan, B. S., *Asst. Prof. Agron.*

Animal Industry:
•‡J. E. Ladd, M. S., *Prof. An. Husb.*
•‡J. C. Weldin, Ph. D., *Prof. Bact.; An. Brdg. and Path.*

Animal Industry—Continued.
•‡Howland Burdick, B. S., *Asst. Prof. Dairying and Farm Mach.*
•‡C. P. Hart, B. S., *Instr. Poultry Husb.*
†N. F. Waters, B. S., *Asst. in An. Brdg. and Path.*
•†Helen J. Weaver, M. S., *Instr. Bact.; Asst. in An. Brdg. and Path.*

Botany:
•H. W. Browning, Ph. D., *Prof. Bot.*
†F. T. McLean, Ph. D., *Plant Physiol.*
•Miriam A. Cargill, M. S., *Instr. Bot.*

[1] On leave.

Chemistry:
- •B. L. Hartwell, Ph. D., *Prof Agr. Chem*
- †B. E. Gilbert, Ph. D., *Chem.*
- †W. L. Adams, B. S., *Asst. Chem.*
- †J. E. Blaney, B. S., *Asst. Chem.*
- •S. W. Hetherington, B. S., *Instr. Chem.*
- •J. W. Ince, M. A., *Prof. Chem.*
- •H. L. Jackson, M. S., *Prof. Indus. Chem.*
- •F. W. Keaney, A. B., *Instr. Chem.*
- †J. B. Smith, M. S., *Assoc. Chem.*

Economics (Agr.):
- †R. B. Corbett, Ph. D., *Agr. Econ. (P. O., Providence).*
- †J. L. Tennant, Ph. D., *Assoc. Agr. Econ. (P. O., Providence).*

Education (Agr.):
- •G. H. Baldwin, B. S., *Prof. Teacher Training in Agr.*

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- ‡Sara E. Coyne, B. S., *State Home Dem. Leader.*
- ‡L. F. Kinney, jr., M. S., *State Club Leader.*

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- •Mrs. Wilkie L. Hines, A. M., *Prof. Home Econ.*
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- •Helen A. Searles, *Instr. Institutional Mgt.*
- •Grace C. Whaley, B. E., *Prof. Teacher Training in Home Econ.*

Horticulture:
- †A. E. Stene, M. S., *Pomol.*
- •‡E. P. Christopher, *Instr. Hort.*
- •C. E. Wildon, B. S., *Instr. Hort.*

Physics:
- •William Anderson, M. S., *Prof. Phys.*
- •C. L. Coggins, B. S., *Asst. Prof. Phys.*

Zoology:
- •John Barlow, M. A., *Prof. Zool.*
- •H. M. Emery, B. S., *Instr. Zool.*

Miscellaneous:
- †R. E. Potter, *Libr.*
- †Nathaniel Helme, *Met.*

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- ‡J. L. Carbery, *Agron. (P. O., Spartanburg).*
- •G. H. Collings, Ph. D., *Assoc. Prof. Agron.*
- ‡R. W. Hamilton, B. S., *Soil Fert. Specialist.*
- ‡S. L. Jeffords, M. S., *Forage Crops Specialist (P. O., Spartanburg).*
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- †A. H. Meyer, Ph. D., *Assoc. Agron.*
- †J. D. Warner, M. S., *Asst. Agron.*

Animal and Poultry Husbandry:
- •†‡L. V. Starkey, M. S., *Prof. An. Husb.; An. Husb.*
- •†‡C. L. Morgan, M. S., *Prof. Poultry Husb.; Poultry Husb.*
- ‡A. L. Dultant, M. S., *Livestock Specialist (P. O., Spartanburg).*

Animal and Poultry Husbandry— Continued.
- †E. G. Godbey, B. S., *Asst. An. Husb.*
- ‡J. R. Hawkins, M. S., *Livestock Specialist (P. O., Florence).*
- ‡L. G. Neel, B. S., *Poultry Specialist.*
- •R. R. Ritchie, B. S., *Instr. An. Husb.*

Botany and Bacteriology:
- Director Barre *in charge (State Path.).*
- •†W. B. Aull, B. S., *Assoc. Prof. and Assoc. Bact.*
- †L. M. Fenner, M. S., *Asst. State Path.*
- †C. A. Ludwig, Ph. D., *Assoc. Bot. and Plant Path.*
- •M. A. Rice, M. S., *Instr. Bot.*
- •D. B. Rosenkrans, M. A., *Assoc. Prof. Bot.*

Chemistry:
- •†R. N. Brackett, Ph. D., *Dir. of Dept. (State Chem.).*
- •W. L. Lippincott, B. Ch., *Prof. Chem.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

Chemistry—Continued.
- •†J. H. Mitchell, M. S., *Prof. Chem.; Research Chem.*
- •F. H. Pollard, Ph. D., *Assoc. Prof. Chem.*

Dairying:
- •†‡J. P. La Master, B. S., *Prof. Dairying; Dairyman.*
- •B. E. Goodale, B. S., *Assoc. Prof. Dairying.*
- †K. S. Morrow, M. S., *Assoc. Dairyman.*
- ‡R. E. Waters, B. S., *Agt. in Dairying (P. O., Spartanburg).*

Economics (Agr.):
- •†‡W. C. Jensen, Ph. D., *Prof. Agr. Econ.; Agr. Econ. and Actg. Head of Div.*
- ‡G. E. Prince, B. S., *Chief Div. of Markets (Coop. U. S. D. A.: P. O., Aiken).*
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- ‡L. H. Lewis, B. S., *Agt. in Mktg. (P. O., Florence).*
- •†W. H. Mills, A. B., D. D., *Prof. Rural Sociol.; Agr. Econ. Specialist.*
- ‡C. A. Owens, B. S., *Packing and Grading Specialist (P. O., Aiken).*
- †B. A. Russell, B. S., *Asst. Agr. Econ. (Coop. U. S. D. A.).*

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- ††‡A. B. Bryan, B. S., B. Litt., *Agr. Editor and Chief Div. of Pubs.*
- ‡J. R. Detherage, *Asst. Agr. Editor.*

Education (Agr.):
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- •T. L. Ayers, B. S., *Assoc. Prof. Agr. Ed.*
- •I. W. Duggan, B. S., *Asst. Prof. Agr. Ed. (P. O., Seneca).*
- •J. E. McLean, B. S., *Asst. Prof. Agr. Ed. (P. O., Central).*
- •Verd Peterson, M. S., *Consult. Prof. Agr. Ed. (P. O., Columbia).*

Entomology—*See* **Zoology.**

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- ‡D. W. Watkins, B. S., *Asst. Dir.*
- ‡Lonnie I. Laudrum, B. S., *State Home Dem. Agt. (P. O., Rock Hill).*
- ‡Mrs. Harriett F. Johnson, A. B., *State Club Agt. (P. O., Rock Hill).*
- ‡B. O. Williams, B. S., *State Club Agt.*

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- ‡Harriette B. Layton, *Asst. State Home Dem. Agt. (P. O., Rock Hill).*
- ‡I. D. Lewis, M. S., *Asst. State Club Agt.*

Home Economics:
- †Mary E. Frayser, M. A., *Home Econ. Specialist.*

Horticulture:
- •†‡A. M. Musser, B. S., *Actg. Prof. Hort.; Actg. Hort.*
- •B. D. Ezell, M. S., *Instr. Hort.*
- •C. C. Newman, B. S., *Prof. Hort.*
- •†E. H. Rawl, M. S., *Assoc. Prof. and Assoc. Hort.*
- ‡A. E. Schilletter, B. S., *Ext. Hort.*

Veterinary Science:
- •†R. O. Feeley, D. V. S., *Prof. Vet. Sci.; Consult. Vet.*

Zoology and Entomology:
- •††‡Franklin Sherman, M. S., *Prof. Zool. and Ent.; Ent. (State Ent.).*
- †J. A. Berly, B. S., *Asst. State Ent.*
- †O. L. Cartwright, M. S., *Asst. Ent.*
- •David Dunavan, B. S., *Asst. Prof. Zool. and Ent.*
- †C. O. Eddy, M. S., *Assoc. Ent.*
- †W. T. Henerey, B. S., *Asst. Ent.*
- ‡J. O. Pepper, M. S., *Ext. Ent.*
- ‡E. S. Prevost, *Beekeeping Specialist.*
- •R. L. Wallis, B. S., *Instr. Zool. and Ent.*

Miscellaneous:
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- •Marguerite V. Doggett, A. B., *Libr.*
- •††S. W. Evans, *Treas.*
- †Burns Gillison, *Foreman of Expt. Farm.*
- †C. S. Patrick, B. S., *Head of Farms Dir.*

Substations:

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- W. B. Albert, Ph. D., *Asst. Plant Physiol.*
- E. W. Dunnam, M. S., *Asst. Ent. (Coop. U. S. D. A.).*
- E. E. Hall, M. S., *Agron.*

Coast Expt. Sta., *P. O., Summerville*—E. D. Kyzer, B. S., *Supt.*

Pee Dee Expt. Sta., *P. O., Florence*—R. E. Currin, *Supt.*

Sand Hill Expt. Sta., *P. O., R. F. D. 5, Columbia*—J. A. Riley, M. S., *Supt.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal and poultry husbandry, etc.

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•Mae A. Black, L. I., *Instr. Nutr. and Household Furnishings.*
‡Dora E. Boston, *Supvr. Home Dem. Work.*
•‡J. P. Burgess, *Field Supvr. Voc. Agr.*
•Lillian L. Burwell, B. S., *Instr. Biol. and Bact.*
•Bernice A. Coleman, *Instr. Dietetics.*
•‡H. E. Daniels, B. S., *Asst. Dir. Ext. Work.*
•Ida P. Davis, R. N., *Instr. Nurse Training and Sanitation.*
•Marian J. Gardiner, *Dir. Home Econ.*
•A. H. Gordon, A. B., *Prof. Econ.*
•E. A. Grant, B. S., *Instr. Agr. Teacher Training.*
•Celeste G. Hatcher, *Libr.*
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•Bessie J. Highwarden, *Instr. Handicrafts.*
•Milbia Johnakin, B. S., *Instr. Agr. Teacher Training.*
•T. J. Lyles, B. S., *Dairying.*
•Lilla M. Mitchell, *Instr. Sewing.*
•Anna L. Overstreet, L. I., *Instr. Household Econ.*
•Mattie E. Pegues, *Instr. Teacher Training.*
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South Dakota State College of Agriculture and Mechanic Arts and the Agricultural Experiment Station, *Brookings*

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‡A. E. Anderson, M. S., *Dir. of Ext. Div.*
•†‡R. A. Larson, *Secy.*

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•†A. N. Hume, Ph. D., *Prof. Agron.; Agron. and Supt. of Substas. Dir. State Soil Survey.*
•†J. G. Hutton, M. S., *Assoc. Prof. and Assoc. Agron. Asst. Dir. State Soil Survey.*
•†Matthew Fowlds, B. S., *Asst. Prof. and Asst. Agron.*
•C. J. Franzke, B. S., *Asst. in Agron. (Crops).*
•†E. W. Hardies, M. S., *Asst. Prof. and Asst. Agron. (Field Crops).*
‡R. E. Johnston, B. S., *Agron. Specialist.*
•†L. F. Puhr, M. S., *Asst. Prof. and Asst. Agron.*

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•†J. W. Wilson, M. S., LL. D., *Prof. An. Husb.; An. Husb.*
•†G. L. Stevenson, B. S., *Prof. Poultry Husb.; Poultry Husb.*
•†F. U. Fenn, M. S., *Instr. and Asst. An. Husb.*
‡W. R. Hauser, B. S., *Livestock Specialist.*
‡D. C. Henderson, M. S., *Poultry Specialist.*
•†T. R. H. Wright, B. S., *Assoc. Prof. and Assoc. An. Husb.*

Botany and Plant Pathology:
•A. T. Evans, Ph. D., *Prof. Bot. and Plant Path.*
•Ethel Belk, B. S., *Asst. in Bot.*
•George Cross, M. S., *Instr. Bot.*
•Kenneth Simons, B. S., *Asst. in Bot.*
•Leon Tyler, B. S., *Asst. in Bot.*

Chemistry:
•†B. A. Dunbar, A. M., *Prof. Chem.; Chem.*
•E. R. Binnewies, M. S., *Assoc. Prof. Chem.*
•D. C. Farley, B. S., *Instr. Chem.*
•†C. F. Wells, M. S., *Asst. Prof. and Asst. Chem.*

Dairy Husbandry:
•†T. M. Olson, M. S., *Prof. Dairy Husb.; Dairy Husb.*
‡Gerald Heebink, M. S., *Dairy Specialist.*
•†L. H. Minor, M. S., *Instr. and Asst. Dairy Husb.*
•C. C. Totman, B. S., *Instr. Dairy Mfrs.*

Economics (Agr.):
•†‡M. R. Benedict, B. S., *Prof. Farm Econ.; Farm Econ.*
•†Gabriel Lundy, M. S., *Asst. Prof. and Asst. Farm Econ.*

Economics (Agr.)—Continued.
- •Joseph Orr, *Agr. Statistician (Coop. U. S. D. A.).*
- •†R. E. Post, M. S., *Asst. Prof. and Asst. Farm Econ.*
- •†R. H. Rogers, M. S., *Instr. Farm Econ.; Farm Mgt. Research.*
- ‡W. F. Schnaidt, B. S., *Mktg. Specialist.*

Editorial—*See* **Journalism.**

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- •C. R. Wiseman, M. S., *Asst. Prof. in charge.*
- •W. P. Beard, B. S., *Asst. in Agr. Ed.*

Engineering (Agr.):
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- •F. H. Andrews, *Instr. Forge Shop.*
- •J. A. Bonell, Asst. *Prof. Agr. Engin.*
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Entomology—*See* **Zoology.**

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- ‡V. D. Bassart, B. S., *Asst. County Agt. Leader.*
- ‡May Kiethline, *Asst. State Club Leader.*

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- •Ada B. Caldwell, *Prof. Indus. Arts.*
- ‡Mary A. Dolve, B. S., *Foods and Nutr. Specialist.*
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- •Louise L. Leaton, B. S., *Asst. Prof. Home Econ.*
- •Ebba Lundgren, B. S., *Instr. Foods and Clothing.*
- •Laura J. McArthur, B. S., *Asst. Prof. Home Econ.*
- •Ora Sloat, B. S., *Instr. Home Econ.*
- •Blanche Tompkins, B. S., *Asst. in Home Econ.*

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- ‡Susan Z. Wilder, M. S., *Foods and Nutr. Specialist.*

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- ‡A. L. Ford, M. S., *Hort. and Ent. Specialist.*
- •P. L. Keene, M. S., *Asst. Prof. Hort.*

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- •R. W. Kenworthy, M. S., *Instr. Phys.*

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- ‡G. S. Weaver, V. S., *An. Disease Specialist.*

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- ‡R. O. Bulger, B. S., *State Leader Barberry Erad. (Coop. U. S. D. A.).*
- •†G. I. Gilbertson, M. S., *Asst. Prof. and Asst. Ent.*
- •Nellie Hartwig, M. S., *Instr. Zool. and Ent.*
- •E. C. O'Roke, M. A., *Asst. Prof. Zool.*

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- Cottonwood—Wesley Feurestenau, *Foreman.*
- Eureka—Walter Schonbrod, *Foreman.*
- Vivian—Frank Hussey, *Foreman.*

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- •O. W. Dynes, M. S., *Prof. Agron.*
- •R. H. Austin, M. S., *Asst. Prof. Agron.*

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- †J. G. Faulkner, *Asst. in Plat Work.*
- ‡J. C. McAmis, B. S., *Agron. Specialist.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal and poultry husbandry, etc.

[2] On leave.

Agronomy—Continued.

†L. S. Mayer, M. S., *Asst. Agron. in charge Corn Invest.* (*Coop. U. S. D. A.*).

‡R. H. Milton, B. S., *Asst. Agron. in charge Tobacco Work* (*P. O., Nashville*).

†H. P. Ogden, B. S., *Assoc. Agron.*

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‡A. J. Chadwell, B. S., *Poultry Husb. Specialist.*

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†C. C. Flanery, M. A., *Sheep Husb. Specialist* (*P. O., Nashville*).

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‡L. A. Richardson, B. S., *An. Husb. Specialist.*

‡J. C. Snow, B. S., *Poultry Specialist* (*P. O., Nashville*).

†G. V. Warmbrod, B. S., *Asst. An. Husb.* (*P. O., Columbia*).

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*G. M. Cameron, B. S., *Instr. Bact.*

Botany:

*L. R. Hesler, Ph. D., *Prof. Bot.*

†S. H. Essary, M. S., *Bot.*

†C. D. Sherbakoff, Ph. D., *Plant Path.*

†J. O. Andes, M. A., *Asst. Plant Path.*

†E. S. Brown, *Asst. Plant Path.*

†Newman Hancock, B. S., *Asst. Bot.*

†Mrs. Helen M. Hutchens, A. B., *Asst. Plant Path.*

*H. M. Jennison, Ph. D., *Prof. Bot.*

*R. G. Turner, B. S., *Instr. Bot.*

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†W. H. MacIntire, Ph. D., *Soil Chem.*

*C. A. Buehler, Ph. D., *Assoc. Prof. Chem.*

†Esther M. Crawford, B. S., *Asst. Biochem.*

*C. O. Hill, Ph. C., M. S., *Prof. Org. and Agr. Chem.*

†Margaret B. MacDonald, Ph. D., *Biochem.*

*J. H. Robertson, Ph. D., *Prof. Chem.*

†K. B. Sanders, B. S., *Asst. Soil Chem.*

†W. M. Shaw, M. S., *Assoc. Soil Chem.*

†G. A. Shuey, B. S., *Assoc. Chem.*

†J. B. Young, B. A., *Asst. Soil Chem.*

Dairy Husbandry:

*C. E. Wylie, M. A., *Prof. Dairying.*

L. S. Edwards, B. S., *Dairy Mfg. Specialist* (*Coop. U. S. D. A.: P. O., Lebanon*).

*T. B. Harrison, B. S., *Asst. Prof. Dairying.*

Dairy Husbandry—Continued.

‡C. A. Hutton, B. S., *Dairy Husb. Specialist.*

‡G. N. Tobey, *Cheese Specialist.*

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*†C. E. Allred, M. S., *Prof. Agr. Econ.; Agr. Econ.*

‡A. L. Jerdan, M. S., *Mktg. Specialist.*

‡Elizabeth Moreland, B. A., *Community Service Specialist.*

Editorial:

‡A. J. Sims, *Ext. Editor.*

Education (Agr.):

*N. E. Fitzgerald, B. Pd., M. S., *Prof. Agr. Ed.*

*E. D. Stivers, M. S., *Prof. Agr. Ed. in charge Itinerant Work.*

*A. L. Rubin, B. S., D. V. M., *Asst. Prof. Agr. Ed.* (*P. O., Fountain City*).

Engineering (Agr.):

*H. A. Arnold, B. S., *Instr. Agr. Engin.*

Entomology—*See* **Zoology.**

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Forestry—*See* **Horticulture.**

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*Jeannette Gill, B. A., *Asst. Institutional Mgr.*

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[1] For subject matter workers see the respective divisions, i. e., agronomy, animal husbandry, etc.

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- ‡W. C. Pelton, M. S., *Hort. Specialist.*
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- •J. P. Jones, Ph. D., *Asst. Prof. Zool.*
- †Simon Marcovitch, Ph. D., *Ent.*
- •B. C. V. Ressler, M. S., *Asst. Prof. Zool.*

Zoology and Entomology—Continued.
- †W. W. Stanley, B. S., *Asst. Ent.*
- •C. M. Wheeler, M. S., *Instr. Ent.*

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- •†F. H. Broome, *Secy. and Photog.*
- •W. A. Campbell, *Farm Supt.*
- •†Elizabeth Cheatham, B. A., *Libr.*
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- Middle Tenn. Expt. Sta., *P. O., Columbia*—L. P. Neel, B. S., *Supt.*
- Plateau Expt. Sta., *P. O., Crossville*—R. E. Martin, *Supt.*
- Tobacco Expt. Sta., *P. O., Clarksville*—H. W. Jones, *Supt.*
- West Tenn. Expt. Sta., *P. O. Jackson*—S. A. Robert, B. S., *Supt.*

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- •Mrs. D. A. Forbes, *Laundering.*
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- •Mrs. W. H. Hodgkins, *Poultry Raising.*
- •W. W. Lawson, B. S., *Teacher Training in Agr.*
- •Acolian Lockert, B. S., *Voc. Agr.*
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- •Frances E. Thompson, B. S., *Manual Art.*
- •Mrs. Mary L. Wilson, *Household Mgt.*

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- †A. B. Conner, M. S., *Actg. Dir. of Sta.*
- ‡O. B. Martin, A. M., *Dir. of Ext. Service*
- •Charles Puryear, M. A., C. E., LL. D., *Dean of Coll. and Grad. School*
- •E. J. Kyle, M. S., *Dean School of Agr.*

Agronomy:
- †E. B. Reynolds, M. S., *Chief of Div.*
- †A. B. Conner, M. S., *Vice Dir. of Sta. (Grain Sorghum Research).*
- †R. E. Karper, B. S., *Asst. Dir. and Actg. Vice Dir. of Sta. (Small Grain Research).*
- •J. O. Morgan, Ph. D., *Head Prof. Agron. Vice Dean School of Agr.*
- •L. G. Jones, Ph. D., *Prof. Agron.*
- †D. T. Killough, M. S., *Agron. (Cotton Brdg.).*
- †G. T. McNess, *Supt. Main Sta. Farm.*
- †P. C. Mangelsdorf, Sc. D., *Agron. (Corn and Small Grains).*
- ‡E. A. Miller, B. S., *Agron.*

Agronomy—Continued.
- •J. S. Mogford, M. S., *Assoc. Prof. Agron.*
- †H. E. Reu, B. S., *Agron. (Cotton Root Rot Invest.; P. O., Temple).*
- •R. T. Stewart, M. S., *Assoc. Prof. Agron.*
- •M. B. Sturgis, B. S., *Instr. Agron.*

Animal Husbandry:
- †J. M. Jones, A. M., *Chief Div. of Range An. Husb. (Sheep and Goat Research).*
- •D. W. Williams, M. S., *Head Prof. An. Husb.*
- ———, *Head Prof. Dairy Husb.*

[1] On leave.

Animal Husbandry—Continued.

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†R. M. Sherwood, M. S., *Chief Div. Poultry Husb.*
†Fred Hale, M. S., *Chief Div. of Swine Husb.*
‡G. W. Barnes, B. S., *Beef Cattle Specialist.*
*J. A. Clutter, jr., M. S., *Prof. Dairy Husb.*
†W. H. Dameron, B. S., *Wool Grader.*
*A. L. Darnell, M. A., *Prof. Dairy Husb.*
‡E. R. Eudaly, B. S., *Swine Husb.*
*Ernest Gibbens, B. S., *Asst. Prof. An. Husb.*
*A. H. Groth, M. S., *Asst. Prof. An. Husb.*
‡E. N. Holmgreen, B. S., *Poultry Specialist.*
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†J. L. Lush, Ph. D., *An. Breeder.*
*A. K. Mackey, M. S., *Assoc. Prof. An. Husb.*
‡J. L. Thomas, B. S., *Dairy Specialist.*
*R. H. Williams, Ph. D., *Prof. An. Husb.*

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*C. C. Doak, B. S., *Instr. Biol.*
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*D. J. Pratt, A. M., *Prof. Biol.*

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†Helge Ness, M. S., *Chief of Div. (Berry Breeder).*

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†G. S. Fraps, Ph. D., *Chief Div. of Chem. (State Chem.).*
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†E. C. Carlyle, B. S., *Asst. Chem. (Cotton Root Rot Invest.).*
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†Velma Graham, *Asst. Chem.*
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*L. A. Koenig, B. A., *Asst. Prof. Chem.*
*E. R. Middleton, M. S., *Instr. Chem.*
†Iola Miller, *Asst. Chem.*

[1] On leave.

Chemistry—Continued.

†T. L. Ogier, B. S., *Asst. Chem.*
*W. M. Potts, M. S., *Instr. Chem.*
†A. J. Sterges, M. S., *Asst. Chem.*
*R. E. Snuggs, M. S., *Instr. Chem.*
†W. H. Walker, *Asst. Chem.*

Economics:

†L. P. Gabbard, M. S., *Chief Div. Farm and Ranch Econ.*
†B. Youngblood,[1] Ph. D., *Farm and Ranch Econ.*
*V. P. Lee, Ph. D., *Head Prof. Mktg. and Finance.*
*T. W. Leland, M. A., *Head Prof. Accounting and Statistics.*
*S. A. McMillan, M. S., *Head Prof. Farm and Ranch Mgt.*
*Daniel Russell, A. B., *Head Prof. Rural Sociol.*
†C. A. Bonnen, M. S., *Farm Mgt. Research Specialist.*
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[1] For subject-matter workers see the respective division, i. e., agronomy, animal and poultry husbandry, etc.

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[1] On leave.

[2] For subject matter workers see the respective division, i. e., agronomy, animal industry, etc.

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[1] For subject-matter workers see the respective division, i. e., animal husbandry, bacteriology, etc.

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[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

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*†J. M. Fargo, M. S., *Asst. Prof. and Asst. An. Husb.*
*†J. G. Fuller, B. S., *Prof. An. Husb.; An. Husb.*
*‡R. T. Harris, *Supvr. in charge Dairy Tests.*
*††Frank Kleinheinz, *Asst. Prof. An. Husb.* (*Sheep*).
‡A. M. Mucks, B. S., *An. Husb. Specialist.*
*†B. H. Roche, M. S., *Instr. and Asst. in An. Husb.*
*†L. W. Rupel, M. S., *Instr. and Asst. An. Husb.*

Bacteriology:
*††E. G. Hastings, M. S., *Chair. of Dept.*
*I. L. Baldwin, Ph. D., *Asst. Prof. Agr. Bact.*
*††E. B. Fred, Ph. D., *Prof. Agr. Bact.; Agr. Bact.*
*††W. D. Frost, Ph. D., D. P. H., *Prof. Agr. Bact.; Agr. Bact.*

Bacteriology—Continued.
†Elizabeth F. McCoy, M. S., *Research Asst. in Agr. Bact.*
*††Harriet L. Mansfield, M. S., *Instr. Agr. Bact.*
*Myrtle A. Shaw, Ph. D., *Instr. Agr. Bact.*
*†W. H. Wright, Ph. D., *Assoc. Prof. Agr. Bact.; Agr. Bact.*

Chemistry:
*†E. B. Hart, B. S., *Chair. of Dept.*
*†S. M. Babcock, Ph. D., *Prof. Emeritus Agr. Chem.*
*†C. A. Elvehjem, Ph. D., *Instr. and Asst. Agr. Chem.*
*†S. W. F. Kletzien, M. S., *Instr. and Asst. Agr. Chem.*
†C. W. Lindow, M. S., *Asst. Agr. Chem.*
*†K. P. Link, Ph. D., *Asst. Prof. and Asst. Agr. Chem.*
*†W. H. Peterson, Ph. D., *Prof. Agr. Chem.; Agr. Chem.*
*†Blanche Rilsing, M. S., *Asst. Agr. Chem.*
†G. A. Schraeder, M. S., *Asst. Agr. Chem.*
†H. T. Scott, M. S., *Asst. Agr. Chem.*
*†Harry Steenbock, Ph. D., *Prof. Agr Chem; Agr. Chem.*
*†W. E. Tottingham, Ph. D., *Assoc. Prof. Agr. Chem.; Agr. Chem.*
*†James Waddell, Ph. D., *Research Assoc. in Agr. Chem.*

Dairy Husbandry:
*††H. C. Jackson, Ph. D., *Chair. of Dept.*
*†E. H. Farrington, M. S., *Prof. Emeritus Dairy Husb.*
*††J. L. Sammis, Ph. D., *Assoc Prof. Dairy Husb.; Dairy Husb.*
*††H. H. Sommer, Ph. D., *Assoc. Prof. Dairy Husb.; Dairy Husb.*
‡H. T. Sondergaard, *Dairy Specialist.*
*†L. C. Thomsen, B. S., *Instr. and Asst. Dairy Husb.*

Economics (Agr.):
*††B. H. Hibbard, Ph. D., *Chair. of Dept.*
*R. W. Allin, Ph. D., *Instr. Agr. Econ.*
‡H. H. Bakken, M. A., *Mktg. Specialist.*
‡J. S. Donald, B. S., D. D. S., *Agr. Econ. Specialist* (*Coop. U. S. D. A.*).
‡Rudolph Froker, B. S., *Mktg. Specialist*
*†A. J. Haas, *Instr. and Asst. in Agr. Econ.*

[1] On leave.

Economics (Agr.)—Continued.
†W. A. Hartman, M. S., *Research Asst. in Agr. Econ.*
•††J. H. Kolb, Ph. D., *Prof. Agr. Econ. (Rural Life); Agr. Econ.*
•†P. E. McNall, M. S., *Prof. Agr. Econ.; Agr. Econ.*
•†Theodore Macklin, Ph. D., *Prof. Agr. Econ.; Agr. Econ.*
•M. C. Riley, LL. B., *Lect. in Agr. Econ.*
•M. A. Schaars, M. S., *Instr. Agr. Econ.*
•†G. S. Wehrwein, Ph. D., *Prof. Agr. Econ.; Land Econ.*
•†A. F. Wileden, M. A., *Instr. and Asst. Agr. Econ.*

Editorial—*See* **Journalism.**

Education (Agr.):
•J. A. James, B. S., *Chair. of Dept. and Asst. Dean of Coll. of Agr.*
•‡E. M. Tiffany, M. S., *Assoc. Prof. Agr. Ed.*

Engineering (Agr.):
•††E. R. Jones, M. S., *Chair. of Dept.*
•‡F. W. Duffee, B. S., *Assoc. Prof. Agr. Engin.*
†W. A. Hartman, M. S., *Research Asst. in Agr. Engin.*
•C. H. Jefferson, B. S., *Instr. Agr. Engin. (Farm Bldgs.).*
•†R. H. Reed, B. S., *Instr. Agr. Engin.; Invest. in Corn Borer Control Mach.*
‡W. A. Rowlands, B. S., *Land Clearing Specialist.*
•††J. H. Swenehart, B. S., *Prof. Agr. Engin. (Land Clearing); Agr. Engin.*
‡F. G. Wilson, B. S., *For. Specialist (Coop. U. S. D. A.).*
‡O. R. Zeasman, B. S., *Agr. Engin. Specialist.*

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•††H. F. Wilson, M. S., *Chair. of Dept.*
•††C. L. Fluke, jr., M. S., *Asst. Prof. and Asst. Econ. Ent.*
•†A. A. Granovsky, M. S., *Asst. Prof. and Asst. Econ. Ent.*
•†G. E. Marvin, M. S., *Instr. Econ. Ent.*
•Warren Whitcomb, jr., M. S., *Asst. Econ. Ent.*

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•†R. A. Brink, D. Sc., *Assoc. Prof. and Asst. in Genetics.*
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†E. E. Van Lone, M. S., *Asst. in Genetics.*
†Agnes Zelmet, M. A., *Tech. Asst. in Genetics.*

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•††Abby L. Marlatt, D. Sc., *Chair of Dept. and Dir. of Courses.*
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•Helen L. Allen, M. A., *Instr. Home Econ.*
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•Hazel Manning, M. S., *Assoc. Prof. Home Econ.*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal husbandry, etc.

Home Economics—Continued.

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†Stella Munger, M. S., *Asst. Home Econ.*
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‡Gladys S. Stillman, Ph. B., B. S., *Home Econ. Specialist.*
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•Bessie F. Tyrrell, M. A., *Instr. Home Econ.*

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•†‡J. G. Moore, M. S., M. H., *Chair. of Dept.*
•‡F. A. Aust, M. S., M. L. D., *Assoc. Prof. Hort. (Landsc. Design).*
†‡J. W. Brann, M. S., *Hort. Specialist.*
•E. F. Burk, M. S., *Instr. Hort.*
•†A. H. Finch, M. S., *Instr. and Research Asst. Hort.*
†Isme A. Hoggan, Ph. D., *Research Asst. Hort.*
•†‡James Johnson, Ph. D., *Prof. Hort.; Hort. (Coop. U. S. D. A.).*
‡C. L. Kuehner, B. S., *Hort. Specialist.*
•†‡J. G. Milward, M. S., *Prof. Hort.; Hort.*
†W. B. Ogden, B. S., *Research Asst. Hort.*
•W. D. Popham, B. S., *Instr. Hort.*
•†‡R. H. Roberts, Ph. D., *Assoc. Prof. Hort.; Hort.*
•†R. P. Thomas, M. S., *Asst. in Hort.*

Journalism:

•†‡A. W. Hopkins, B. L., *Chair. of Dept., Editor.*
•‡F. J. Holt, M. S., *Instr. Agr. Journalism.*
•†‡Grace E. Langdon, B. A., *Instr. Agr. Journalism.*
•†W. E. Ogilvie, M. S., *Tech. Asst. in Agr. Journalism.*
•‡W. A. Sumner, B. S., *Assoc. Prof. Agr. Journalism, Assoc. Editor.*

Plant Pathology:

•†‡L. R. Jones, Ph. D., D. Sc., *Chair. of Dept.*
•†‡J. W. Brann, M. S., *Asst. Prof. Plant Path.*

Plant Pathology—Continued.

•†J. G. Dickson, Ph. D., *Prof. Plant Path.; Plant Path. (Coop. U. S. D. A.).*
•E. M. Gilbert, Ph. D., *Prof. Plant Path.*
•†G. W. Keitt, Ph. D., *Prof. Plant Path.; Plant Path.*
•†P. W. Miller, M. S., *Instr. and Asst. in Plant Path.*
†Norma Pearson, M. A., *Asst. Plant Path.*
•†A. J. Riker, Ph. D., *Asst. Prof. and Research Assoc. in Plant Path.*
†Rose Smith, Ph. D., *Research Assoc. in Plant Path.*
•‡R. E. Vaughan, M. S., *Prof. Plant Path.*
†J. C. Walker, Ph. D., *Assoc. Plant Path.*
†E. E. Wilson, Ph. D., *Research Asst. Plant Path.*

Poultry Husbandry:

•†‡J. G. Halpin, B. S., *Chair. of Dept.*
‡Gerald Annin, B. S., *Poultry Specialist.*
‡J. B. Hayes, B. S., *Asst. Prof. Poultry Husb.*
•†‡O. N. Johnson, *Asst. in Poultry Husb.*

Soils:

•†‡A. R. Whitson, B. S., *Chair. of Dept.*
†‡A. R. Albert, B. S., *Instr. Soils; Asst. in State Soils Lab. (P. O., Hancock).*
†‡C. J. Chapman, B. S., *Asst. Prof. Soils and Chem. in State Soils Lab.*
•W. J. Gelb, M. Agr., *Asst. Prof. Soils, Soil Survey Work (Coop. U. S. D. A.).*
•†E. J. Graul, M. S., *Assoc. Prof. Soils; Asst. in State Soils Lab.*
•H. H. Hull, M. S., *Instr. Soils.*
•†‡F. L. Musbach, B. S., *Prof. Soils (P. O., Marshfield).*
•‡Griffith Richards, B. S., *Assoc. Prof. Soils.*
•†R. P. Thomas, M. S., *Asst. in Soils.*
•†Emil Truog, M. S., *Prof. Soils; Soils.*
‡O. R. Zeasman, B. S., *Asst. Prof. Soils.*

Veterinary Science:

•†‡F. B. Hadley, D. V. M., *Chair. of Dept.*
•A. S. Alexander, F. H. A. S., M. D. C., *Prof. Vet. Sci.*
•†‡B. A. Beach, D. V. M., *Assoc. Prof. Vet. Sci.; Vet*
•†C. R. Strange, D. V. M., *Instr. Vet. Sci.; Asst. Vet.*

Miscellaneous:

•†‡W. S. Clark, B. S., *Asst. to Dean and Dir.*
•†‡A. J. Haas, *Executive Secy.*
•†C. S. Henn, B. A., *Libr.*

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J. E. Smith, B. S., *Soils (P. O., Ashland).*

Substations—Continued.

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Marshfield Sta.—
F. L. Musbach, B. S., *in charge.*
A. M. Strommen, *Asst. in Agron.*

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‡A. E. Bowman, B. S., *Dir. of Agr. Ext.*

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•†A. F. Vass, Ph. D., *Prof. Agron.; Agron.*
•†O. T. Bonnett, M. S., *Instr. and Asst. Agron.*
†T. J. Dunnewald, M. S., *Asst. in Soil Invest.*
•†Glen Hartman, B. S., *Asst. Prof. and Asst. Agron.*
•†Harry Pearson, B. S., *Instr. and Field Asst. in Agron.*
‡R. O. Westley, M. S., *Crops and Soils Specialist.*

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•†F. S. Hultz, Ph. D., *Prof. An. Husb.; An. Husb.*
•†R. H. Burns, M. S., *Asst. Wool Specialist.*
•†F. J. Kohn, B. S., *Instr. and Asst. Poultry Husb.*
‡J. R. Neale, B. S., *Livestock and Dairy Specialist.*
‡O. N. Summers, B. S., *Poultry Specialist.*
•†S. S. Wheeler, M. S., *Instr. and Asst. An. Husb.*
•†H. S. Willard, M. S., *Asst. Prof. and Asst. An. Husb.*

Botany:

•†Aven Nelson, Ph. D., D. Sc., *Prof. Bot.; Bot. and Hort.*
•H. L. Willis, M. S., *Instr. Hort.*

Chemistry:

•P. T. Miller, M. A., *Prof. and Head of Dept.*
†O. A. Beath, M. A., *Research Chem.*
†H. F. Eppson, B. S., *Service Chem.*
†C. S. Gilbert, M. A., *Asst. Research Chem.*
•†F. E. Hepner, M. S., *Assoc. Prof. Chem.; Head of Weather Sta.*
†O. C. McCreary, Ph. D., *Assoc. Research Chem.*
•L. E. Walter, M. S., *Prof. Chem (State Chem.).*

Education (Agr.):

•S. H. Dadisman, M. S., *Assoc. Prof. Teacher Training in Agr.*
•Mrs. Clara B. Bowman, B. A., *Asst Prof. Rural Ed.*

Engineering (Agr.):

•J. C. Fitterer, B. S., C. E., *Prof. Irrig. Engin.*

Extension (Admin.):[1]

Director Bowman *in charge.*
‡F. P. Lane, B. S., *County Agt. Leader.*
‡Mary Rokahr, A. B., *State Home Dem. Leader.*
‡W. P. Mortenson, M. S., *State Club Leader.*
‡G. W. O'Roke, *Admin. Asst.*

Home Economics:

•†Elizabeth J. McKittrick, M. S., *Head of Dept.*
•Ruth Bumpas, M. S., *Instr. Home Econ.*
•Mrs. Marguerite L. Corkhill, M. S., *Instr. Home Econ.*
‡Bernice Forest, B. S., *Clothing Specialist.*
†Edith G. Grundmeier, M. S., *Research Home Econ.*
‡Evangeline Jennings, B. S., *Nutr. Specialist.*
•Mary S. Lyle, M. S., *Asst. Prof. Teacher Training in Home Econ.*[2]
•Marita Monroe, B. S., *Instr. Institutional Mgt.*

Veterinary Science:

•†Cecil Elder, D. V. M., M. S., *Prof. Vet. Sci. and Bact.; Research Path.*
•†A. M. Lee, D. V. M., *Asst. Prof. Vet. Sci. and Bact.; Asst. Research Path.*

Zoology:

•†J. W. Scott, Ph. D., *Prof. Zool.; Research Parasitol.*
•†‡C. L. Corkins, M. S., *Asst. Prof. Ent.; Ent. (State Ent.).*
‡A. M. Day, B. S., *Rodent Control Specialist (Coop. U. S. D. A.).*

[1] For subject-matter workers see the respective division, i. e., agronomy, animal industry, etc.

[2] Given in College of Education.

Zoology—Continued.

†J. E. Eckert, M. S., *Assoc. Apiculturist (U. S. Bee Culture Field Sta.).*

•†‡C. H. Gilbert, M. S., *Research Apiculturist.*

•A. J. McIntosh, M. A., *Instr. Zool.*

•A. H. Stockard, M. A., *Instr. Zool.*

†A. P. Sturtevant, Ph. D., *Assoc. Apiculturist (in charge U. S. Bee Culture Field Sta.).*

†H. L. Sweetman, M. S., *Asst. Research Ent.*

•Mrs. Lenore Ward, Ph. D., *Instr. Zool. and Physiol.*

Miscellaneous:

•Reba Davis, B. L. S., *Libr.*

†Marion V. Higgins, *Libr.*

‡W. L. Quayle, B. S., *Dir. of Expt. Farms.*

Substations:

Campbell County Expt. Farm, *P. O., Gillette*—D. R. Sabin, B. S., *Supt.*

Cheyenne Expt. Farm, *P. O., Cheyenne*—A. L. Nelson, M. S., *Supt.*

Fremont County Expt. Farm, *P. O., Lander*—J. M. Steinbrech, *Supt.*

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Washakie County Expt. Farm, *P. O., Worland*—J. F. Petersen, *Supt.*

INDEX OF NAMES

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YELLOWS
A SERIOUS DISEASE OF TOMATOES

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YELLOWS, A SERIOUS DISEASE OF TOMATOES

By Michael Shapovalov, *Pathologist, Office of Vegetable and Forage Diseases, Bureau of Plant Industry*

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ORIGIN OF THE NAME "YELLOWS"

"Tomato yellows" is merely a new name for that old plague of the West which has been more or less generally known as western yellow tomato blight. There are not many tomato growers west of the Rocky Mountains who are not familiar with the appearance of this disease: General yellowing of the plant, rigid upwardly rolling leaves, purple veins, and arrested growth with premature death. To be exact, it is not even a strictly new name. Plant pathologists of the Idaho (1904) and the Washington (1922 and 1924) State Agricultural Experiment Stations, where this disease has been studied for a greater number of years than at any other institution, have used the name "yellows" in their annual reports. The writer now recommends that this name be used in the future generally and exclusively in preference to and in place of any other synonyms, such as western blight, yellow blight, summer blight, or simply blight. There are several reasons, both scientific and practical, for adopting this name. The principal ones are stated in the following paragraphs.

REASONS FOR THE NEW NAME

A correct understanding of the nature of this disease has finally been reached, although as yet this knowledge is necessarily of a general character. It is now known that the malady is a virus disease, or, in other words, that its infective principle, whatever it may be, lives and multiplies in the juices of the plants. It is akin to curly top of sugar beets and may be carried from plant to plant by beet leaf hoppers. It is certain that if these insects feed first on the diseased beet and then on a healthy tomato, typical symptoms of what has been known as western yellow blight will result, if other conditions are favorable. In like manner this trouble may be transferred from other plants, both wild and cultivated, if they happen to be affected by the same virus. Such virus diseases, transmitted by leaf hoppers (distinct, however, from another large and well-known group of virus diseases known as mosaic and transmitted

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by aphids), fall into the general group of "yellows," represented by the well-known aster yellows. This fact alone should be sufficient to justify the name "tomato yellows" as a logical substitute for western yellow blight and other local names.

The new name is brief and simple. Any other known name consists of a noun and one or more adjectives, hence there has been a tendency to abbreviate it by leaving out one or all of these adjectives and to call this trouble simply "blight," which frequently led to confusion.

The name "tomato yellows" is clear and can not be misinterpreted. The adjective "western" in connection with this blight is misleading. It was attached to the name when the disease was known to exist only in the extreme northwestern part of the United States. Subsequent observations have definitely shown that it may occur as far east as Iowa. It may also be discovered in the future in other countries, and not necessarily in their western parts. Even after the word "western" is eliminated there remains in the old designation the very objectionable term "blight." There is more than one kind of blight on tomatoes, even in the State of California, and some additional ones in the East. Also, Fusarium wilt has been sometimes erroneously called blight. Often western growers who have bought "blight-proof" tomato seed from eastern concerns, as advertised, thinking of their own "yellow blight," have been greatly disappointed later simply because they had not understood that the blight-resistance claims of the seed houses referred to other blights rather than to "tomato yellows." Such trouble and confusion may readily be avoided by discarding the old chance names and adopting the logical and clear name "tomato yellows."

The new name is appropriately descriptive. The yellow discoloration of the affected plants is a general and invariable characteristic of all the fatal cases. While this important feature is incorporated also in the old name "yellow blight," the word "blight," as has just been shown, is confusing and should be eliminated. "Yellow" is the only valid word in the old names, and by changing it into a noun, "yellows," the recommended name "tomato yellows" is obtained.

Scientists favor the new name. As has been pointed out, this name has already been used in certain published reports. Plant pathologists of the West, at their recent gathering at Reno, Nev.,[1] approved the change. All persons concerned who favor simplicity, clearness, and economy should adopt the new name and use it in conversation and correspondence. By this means the name should get into general usage in a very short time and become established in business transactions among progressive growers, canners, and shippers.

THE PROBLEM OF CONTROL

By dealing with a definite tomato yellows, a virus disease related to curly top of sugar beets and transmitted by beet leaf hoppers, instead of with a mysterious western yellow blight, it may reasonably be expected that the work with control measures will be facili-

[1] Report of the eleventh annual meeting of the Pacific division of the American Phytopathological Society. Phytopathology 17: 745. 1927.

tated, particularly in two directions. In the first place because of the knowledge of the nature of the disease, the control work may be planned with a much clearer object in view and with much less haphazard experimentation. In the second place the accumulation of results will be greatly accelerated by means of artificial inoculations both in the greenhouse and outdoors, because it will not be necessary to depend on accidental and uncertain natural infection as heretofore.

Several State and Federal workers in different parts of the country are engaged in investigations on different phases of the problem of controlling tomato yellows. Some are endeavoring to develop resistant varieties, others are trying to discover some spray which will act as a repellent to the insects, and still others are working with different measures designed to protect the plant itself or to enable it to withstand the infection. Consistent results are being obtained by shading the tomato plants with cloth tents or by interplanting a tall and fast-growing crop such as sunflower. In the experiments of the last two years the percentage of yellows was reduced by this means to less than one-half of that in the adjoining control rows. It appears also that it may be advisable, at least in some parts of the country, to remove the shade, which might be objectionable from the viewpoint of production and picking, after the first part of the summer. Very little yellows, if any, developed in the bureau's experimental plots after the removal of shades about July 1. There are likewise very consistent indications as to the presence of resistance in certain varieties, such as some dwarf types, but the degree of natural resistance in these varieties is very slight and is of no commercial significance. Work is being carried on to develop new and more resistant varieties. It is hoped that the combined efforts of various investigators will eventually lead to the discovery of such effective preventive measures as will permit raising tomatoes even in those sections where tomato culture is now practically impossible on account of an extremely high percentage of yellows.

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POOLING AS PRACTICED BY COOPERATIVE MARKETING ASSOCIATIONS

By CHRIS L. CHRISTENSEN, *Principal Agricultural Economist, Division of Cooperative Marketing, Bureau of Agricultural Economics*

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Pooling as practiced by agricultural cooperative marketing associations involves two essential activities: First, the mingling or grouping together under unified action or control of any function of production or marketing; second, the determination of the results of such group action and the allocation to each participant in the pool of his share of the sales returns, service, expenses, or risks that may arise therefrom.

This is a somewhat broader conception than is accepted by some cooperative leaders. Pooling in its relation to cooperative marketing has been subject to various interpretations. By some, the practice of pooling has been confused with the principles of cooperation, and a certain method or practice of pooling has been often used as a measure to determine not only whether an association was or was not engaged in pooling but also whether it was or was not cooperative in character.

There has been a tendency in some quarters to group cooperative marketing associations in two divisions: (1) Associations which pool sales returns or sales returns and expenses; and (2) those which pool only sales expenses. Associations in the first group have been considered pooling organizations, whereas those in the second group have not.

Certain cooperative leaders, as far back as 1919 and 1920, advanced a theory of cooperative marketing which linked pooling definitely with control of large quantities of the commodity. This conception of pooling, by implication at least, limits the use of the term "cooperative" not only to those organizations that pool sales

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returns, but to a special class in this group—those that emphasize control of a large volume with, probably, control of price as an objective. Consequently, the original conception of pooling has been expanded by these leaders to include certain economic theories and policies with reference to cooperative marketing; in their minds it is an essential principle of cooperation rather than a practice which may vary with each organization.

Others have believed that only associations engaged in marketing a single commodity were actually engaged in pooling. Hence the rather common use of the term "pool" to describe an association handling only one product such as wheat. According to this conception of pooling, an association which handles several kinds of fruits and vegetables or is engaged in marketing one or more products and is also engaged in the purchase of farm supplies is not practicing pooling and is not a pool, although it may embrace many of the characteristics of one.

It is believed by the author that a definition of pooling should cover the practice as it concerns not only sales returns but also operating expenses, marketing, and other business risks, or any combination of these. For instance, the local farmers' elevator associations and the Rice Growers Association of California are types of organizations that apply their pooling activities principally to selling expenses. On the other hand, certain local citrus-fruit packing associations pool their cultivation and harvesting activities in addition to pooling sales expenses and returns from sales. In the usual method of pooling sales returns, like that followed by the New York Dairymen's League, for instance, the members receive returns upon the total net sales of the association, according to the quantity and quality of product delivered.

In other words, the pooling practice appears in one form or another in every cooperative marketing association. It is one of a number of features inherent in cooperative organization. This does not imply, however, that all the activities within a cooperative association are pooling operations nor that pooling is synonymous with cooperative marketing.

ADVANTAGES OF GROUP EFFORT FACILITATED BY POOLING

The aim of pooling is to distribute equitably to all member-patrons the results which accrue from group effort and which can not be attained by individuals acting alone. The following are some of the economic advantages of group effort facilitated by pooling: (1) Improvement of the bargaining position of individual growers, through coordination of their efforts; (2) elimination of waste; (3) spreading marketing risks among all members; and (4) possibility of effective market expansion through control of the time, place, and form in which the commodity is sold.

IMPROVEMENT OF BARGAINING POSITION OF INDIVIDUAL GROWERS

Adequate control of the utility factors in the marketing of any commodity is important if the full market price is to be realized. This control must include the power to decide the time when, the place where, and the form in which, the commodity shall be sold.

It is recognized that supply and demand, in the absence of unusual factors, determine a price range within which a commodity may be sold, and that within this range the advantage of a few cents, which often determines profit or loss, goes to the agency that can bargain most effectively. The combination of large quantities of agricultural commodities under the control of one organization facilitates adaptation of the commodity to actual demand conditions. The mingling by growers of certain marketing functions, under the control of efficient management, permits an effective distribution program.

The collection, analysis, and use of pertinent market information, which is essential to a knowledge of true market value, can be made most effective through group effort in large-scale operations. Furthermore, in entering the markets, large-scale organization can offer commodities in substantial quantities of uniform and desired quality. This attracts the large buyer, who thereby has opportunity to obtain his requirements from a single seller and thus reduce materially the expense and effort incident to making contacts with a large number of small sellers. For these reasons large and reputable distributors are constantly attracted to such cooperative associations as the United Dairies of Washington, the Land O'Lakes Creameries (Inc.), the Pacific Egg Producers, and the Staple Cotton Cooperative Association.

ELIMINATION OF WASTE

The average farmer usually does not have a sufficient quantity of product available for market at any one time to enable him to take advantage of the most economical ways of getting his product to market. The assembling, grading, and preparation for market of small lots of produce by numerous individuals at a local point are more expensive than they are if many small lots can be combined and handled as a few large units under a common administration. Similar economies may be effected in the transportation of agricultural products.

Furthermore, the accumulation of large quantities of commodities at buying points eliminates the waste involved in making a large number of individual contacts on the part of both sellers and purchasers. In addition to the unified selling power which results from pooling, the wool cooperatives, by assembling their wool at important distributing points, have made it possible for wool buyers and mills to decrease considerably the effort and expense of purchasing. This decrease tends to reduce the total cost of distribution and to narrow the spread between producer and consumer.

SPREADING MARKETING RISKS AMONG ALL MEMBERS

The pooling feature in a cooperative association facilitates the spreading of marketing risks among all members.

Any organization engaged in the marketing of agricultural commodities must always reckon with a number of marketing risks, such as price fluctuations, physical deterioration of the product, and financial losses. Agricultural products, as well as other commodities, are always subject to price fluctuations. These may cause severe losses during the time required to assemble, process, and ship to market.

Normal price fluctuations in some commodities (wheat, for instance) may not cause serious risk; but price fluctuations are sometimes very wide, and then the risk becomes too great for a single farmer to bear.

Other risks arise from deterioration of the product while in the process of being assembled and prepared for market, while in transit to market, and while in storage. There are also unavoidable financial risks, such as credit losses, transportation losses, and many others.

These marketing risks are especially important when the producer markets as an individual. The individual producer who assumes these risks may obtain at times considerable profits or he may suffer heavy losses. These operations partake of the nature of speculation, and the individual farmer does not often have the necessary information to enable him to speculate with his own products and compete satisfactorily with professional traders. In a cooperative association these marketing risks and losses, which may be incurred while the product is in the hands of the association, are pooled in the sense that profits and losses are spread among all members in proportion to the products contributed by each member.

POSSIBILITY OF MARKET EXPANSION

Several cooperative associations have already demonstrated the value of rational market-expansion policies. For instance, the California Fruit Growers Exchange has widened its markets through the establishment of brands and the development of recognition and preference for the product. Cooperative associations representing the walnut growers, cranberry growers, egg producers, raisin growers, apple growers, butter and cheese producers, and many others have demonstrated the possibilities of group action in effective market development. Few farmers, as individuals, can afford to undertake market development because of the expense involved and the lack of sufficient supplies to make the exploitation policy permanent. Here, again, the pooling by a large number of growers of the expense, risks, and other features involved in market expansion makes possible a program for widening the market for their product which is of benefit to the grower, but which would be prohibitive were it undertaken by him individually.

POOLING MARKETING EXPENSES

There has been a tendency to group cooperative associations according to whether they pool sales returns or merely operating expenses. Practically every association might be included in the latter group. In fact, most associations pool sales returns more or less completely. Although these two major pooling practices are identical in principle, they differ somewhat in their mechanical application.

In mechanical operations of marketing, savings accrue from the assembling of ordinarily accepted commercial units. For instance, growers who have their commodities assembled, graded, processed for shipment, stored, financed, and transported in quantities which permit economical handling effect definite economies in marketing expense.

One of the conspicuous examples of reduced local marketing expenses brought about by farmers through pooling is to be found in cooperative cream stations. The cream station is the chief market outlet for cream in the less intensive dairy sections, where production is usually rather small for each producer.

In most of the small towns in these sections, several competing cream stations are found. Because of the small volume of business, the expense of handling cream is often relatively high in each station. In Idaho, Illinois, North Dakota, and several other States, cooperative cream stations have been formed by groups of farmers who wanted to secure for themselves the economies that might result from handling a larger aggregate volume of business. Dairymen who formerly patronized several small independent stations have joined together, and, by pooling their cream, have obtained a volume sufficient to reduce materially the expense of local handling. The larger volume enables the station to be better equipped and to render to both the producer and the buyer more satisfactory service. The number of cream stations has been materially reduced by these cooperative organizations. For example, at some points in Idaho when a cooperative cream station had been operating a year, the number of independent stations had decreased.

The question of whether indirect expenses shall be allocated according to physical unit, value, direct labor, or according to some other basis is one that can not be generalized upon. Each case must be considered on its own merits. For example, in storing cotton, one bale occupies approximately the same space as any other bale, and the storage rate recognizes this fact. On the other hand, there may easily be $50 or more difference in the value of two bales of cotton and, were the storage charge based on value, one owner would thus be assessed considerably more than another for the same service—that is, the rental of a definite amount of space.

The pooling of sales expense presents a different problem. As a general rule, it is probably easier to sell a high-grade product than one of inferior quality. When selling expenses are pooled on the basis of value per unit, the high-grade product is paying the highest charge. Is this equitable to all members, or does it tend to penalize the members who deliver a high-quality product? Pooling the selling expense on the basis of physical unit tends to place a higher relative charge on the lower grades. This tends to penalize the lower and inferior grades—which in many instances may be justified, as the inferior grades are usually disturbing factors in the market (or in the price situation). This illustrates the care with which plans for pooling marketing expenses must be worked out before being put into effect, and the danger of generalizing as to such methods.

It is believed that pooling of actual expenses, in short-time pools, is wholly impracticable since many expenses can not be determined by the end of the pooling period, partly because they are not incurred for a period which coincides with the pooling period. Under such conditions it is preferable to fix a definite charge per unit, which will yield an amount sufficient to cover the costs of performing the services, with the thought that any surplus income will be returned to members at the end of the year as a patronage refund.

POOLING SALES RETURNS

One essential result to the grower, among the other advantages that may accrue from the pooling of sales returns, is the averaging of fluctuations in market prices. An equitable distribution of sales returns to growers involves at least three essential considerations: (1) Pooling on the basis of quality, (2) pooling time, or length of the pooling period, and (3) pooling area, or the area to be included in the pool.

ON THE BASIS OF QUALITY

The aim of pooling by quality should be to reflect back to the individual grower the differentials in price which the market affords for the various grades of his product. The grower who, by better selection of his seed, better cultivation, and better harvesting and handling, delivers a superior product for market should have the benefit of the market-value differentials, as reflected in such better prices as the market is willing to pay. The determination of the market-value differentials on products handled by cooperative associations, however, should be given special attention, as these better prices for superior products serve as a stimulus to better production practices.

Cooperative associations with seasonal pools are often confronted with the problem of determining market differentials between grades and varieties of the same commodity, in order to reflect back to the grower equitable normal price differentials between the different qualities of product, under varying market conditions. This problem arises because the year-to-year changes in the relative supply of different grades of the commodity may upset usual price differentials, so that the average annual price of a low-grade pool for a particular season may be equal to that of a high-grade pool because of sale of one grade at one period of the season and another grade at a different time, following a radical change in prices. This situation also arises where, during a short period of relatively high market prices, larger quantities of low-priced grades are being sold. Such price situations reflect short-time changes in demand. They do not reward the producer who plans his operations to meet long-time needs, but tend to place a temporary premium on haphazard production. In other words, so far as market differentials permit, sales returns to growers should, over a long period of time, reflect the extra cost and trouble incurred by the producer of high-quality products.

The obvious accounting procedure for reflecting to growers the value of their products would be to keep separate the expenses and returns for each grade. This is impracticable for several reasons: (1) Some expenses, such as rent, advertising, and salesmen's salaries, are incurred for several grades jointly and any division of these joint expenses must be arbitrary. (2) The sale of two or more grades is often made at a flat price. The buyers pay a price slightly in excess of the value of the lower grades as a means of obtaining the better grades at a slightly reduced price. (3) The keeping of records of expenses and income for each quality handled is very costly and involves at all times a small measure of arbitrary division.

For these reasons some associations have developed a practice of determining normal price differentials between the various grades of their product on the basis of selling experience, and using these differentials in the accounting of their pooling operations.

As a bookkeeping method, this requires only one sales account, to which all returns from sales are credited and against which all direct pooling expenses are charged. The total sales value of all the products of each grade is determined by using the normal price differential applied to the quantities in that grade. Authorized deductions are made from this total sales value.

In pooling on a basis of quality, it is important not to carry refinements in grading to a point beyond the requirements of the trade or to a point at which added expenses involved exceed the market differentials which are reflected back to the grower. This is well illustrated by the experience of a cooperative association in western New York that handled barreled apples. Barreled apples in the past have been marketed in one principal size division, apples 2½ inches in diameter and larger being included in one package. To the growers it seemed that the price range for this size division was unduly wide and that a refinement of the sizing practice might be advantageous. This situation in part prompted the association to adopt a policy of sizing its fruit in ¼-inch grade divisions. After three years' operations under this grading policy, the association found itself confronted with a most difficult sales problem. A careful study of their sales records showed an unusually high customer turnover. Upon further investigation of this phase of their merchandising policy, it was found that few buyers preferred to purchase barrels of quarter-inch sized apples, because such apples were not suited for their trade.

The average retailer is confronted with the problem of supplying one housewife with large apples for cooking purposes, another with small apples for children's use, and perhaps a third with a combination of sizes in a 25-cent purchase. The variety in sizes was not available in a barrel that contained apples uniformly sized in a quarter-inch gradation, but the combination of sizes was available in a barrel containing apples 2½ inches and larger. The retailer could, therefore, carry an adequate stock by purchasing a single barrel of the old-style packing. Hence he had a definite preference for the older method of packing.

The facilities of the United States Department of Agriculture with respect to setting up Federal standards and providing supervision for neutral inspection and grading services based upon United States standards have relieved several cooperative associations of the difficult responsibility of grading accurately superior and inferior commodities with justice to the producer, to the association, and to the buyer.

LENGTH OF POOLING PERIOD

In considering the time element in pooling, it is essential to get the proper balance between the growers' requirements and the demands of efficient management. Growers' requirements include financial needs as well as rewards for care in adjusting production to market demand. For instance, in certain commodities, like peaches and early

potatoes, in the case of which there usually is a wide variation in price between early, mid-season, and late marketings, this factor should be considered in determining the length of the pooling period. The pooling arrangement should aim to reflect back to the grower his normal price advantages. That is, the grower who, by special productive effort, succeeds in getting his product ready for market during the high-price periods of the season should be rewarded for this extra care.

From the standpoint of efficient management, it may be desirable to have a pool which extends over a long period of time in order to assist the organization in its program of marketing. On the other hand, the financial situation of the individual growers often requires a pool of short duration. The value of money is not the same to all growers. The longer the pooling period, the more complex is the credit situation to some growers. In other words, the financial circumstances of some growers often make it difficult for them to market through a seasonal pool.

In considering the time element in pooling from the standpoint of efficient management, the degree to which a cooperative can adjust its operating methods to meet grower demands and yet maintain business efficiency varies. It varies not only with the inherent characteristics of the commodity but with the way in which each association's commodity articulates with the market for the commodity. A cotton cooperative association has as potential customers 4,000 to 5,000 processors (mills) to which it can sell its cotton in comparatively small lots, whereas the New York Dairymen's League must deliver the aggregate product of thousands of producers to a few large distributors.

Cooperative associations are beginning to recognize the necessity for developing pools of varying duration to fit the different needs of individual growers. Take, for example, the large-scale cotton cooperative associations organized in the Southern States in 1920 and 1921. During the first years of their operation these associations pooled entirely on a seasonal basis, but during the last two or three years several of these associations have changed their method of operation and have established pools varying in length of time. Daily pools, 30-day pools, and seasonal pools are now common, and the farmer is given the right to choose the particular time pool to which he wishes his product to go. The daily pools are, in reality, merely an arrangement whereby the association acts as agent. This fact might lead some people to cease to classify the cotton associations as strictly pooling organizations.

With nonperishable commodities, such as wheat and cotton, the operation of short-time pools may be materially assisted by the use of the organized exchanges, which provide future price quotations. Take, for instance, the operation of daily cotton pools, in which the grower is permitted to choose the time of sale. In case a spot sale for that particular quantity can not be made on the date chosen by the grower, the association sells an equivalent quantity on the futures market. This hedge is liquidated at some future date when the actual cotton is disposed of through the spot market outlets of the association.

The theory of a seasonal pool in a cooperative association handling a commodity that is harvested annually during a comparatively short

period but which is marketed throughout a longer period, is that group or association action has economic advantages over individuals operating separately, for an association can hold the product and feed it into the distributing channels more efficiently during the necessary carrying period than can a large number of individuals who operate separately. This requires that the marketing risk be carried by the group or association unless the association is able to transfer certain elements of risk to other parties—which may be done when the commodity is traded in upon an organized exchange or when it is covered by insurance.

In the case of fruits which are to be the raw material for subsequent manufacturing processes, the adjustment of the length of the pooling period on a basis similar to that of the cotton pools would be rather difficult, because of the inherent characteristics of the raw material. Fruits are subject to a degree of deterioration in the raw state which makes it difficult to arrive at probable future market values. If a satisfactory daily, weekly, or monthly pool could be established, it probably would be necessary to sell the raw product on a spot market, either in total at the beginning of the season or by distributing it in smaller quantities from time to time as needed by processors. The seller would assume the marketing risk until the commodity was sold, and the buyer would assume it as soon as the purchase was consummated. A buyer might purchase at the beginning of the season but, because of the inherent characteristics of the commodity, he would buy at a price which would allow the producer a compensation for assuming market risks and which would be somewhat lower than the final average price that might be returned by the association's seasonal pool, in which risks and benefits were assumed by a group of producers.

On the other hand, individual growers who sell small lots from time to time assume the marketing risks individually during the period for which they carry the product. If the growers prefer, the association's services to its members might be limited to grading, market-news information, adequate contact with the buyer, financial assistance, and other services. In this case the grower individually would carry the important marketing risks.

The management side of this problem is even more complicated, because of the lack of any unified control of the commodity in planning the sales program. If a large percentage or tonnage of the commodity were disposed of through the short-time pools, this would defeat the association's processing and merchandising program. In other words, the benefits that accrued from carrying, processing, and merchandising the product would be passed on to private enterprise. And what is perhaps equally, if not more important, in many cases is the fact that the grower might gradually lose contact with the ultimate user of his product.

AREA TO BE INCLUDED IN A POOL

The aim sought in including a large area in one pool is to make the pooling system sufficiently comprehensive to enable a single business unit (1) to control distribution to market and (2) to convert, or

allocate for conversion, the raw product into such uses as will result in the greatest net returns for the industry—usually understood to be operative within an economic area, for example, the New York milk shed. This would require the aggregation of those interests embracing the marketing functions from the origin of the crop to its final distribution. The degree of uniformity of product and time of maturity of harvesting are, with most commodities, factors which influence materially and sometimes limit rather definitely the area which can be included in the same pool.

The pooling features found in a cooperative milk-marketing association will serve to illustrate rather clearly the practices and problems involved in pooling by large areas. In the first place, such a pool requires the selection of the borders of the milk shed, so that all areas which naturally come into competition for the fluid-milk market will be included. If more distant areas, which are not economically competitors with those closer to a given market, are brought into the pool, the total supply is increased and prices to many of those participating in the pool are lower than they would otherwise have been. If too small an area is included, unless the cooperative possesses adequate purchasing machinery to secure supplies outside the regular milk shed, times may occur when dealers are short of supplies and must themselves go outside the milk shed to obtain milk. When this temporary supply from outside the borders of the shed once gains access to the market, it can not easily be prevented from continuing. The final result is an oversupply, except during the low-production periods, and a lower average price to producers.

With the extremes of the milk shed defined, the fluid-milk pooling problem involves further the question whether the milk shed is to be divided into a number of pools related to secondary markets as well as to the primary markets or whether the entire area shall be included in a single pool. That there will be differentials to take care of differences in transportation costs and fat content has been generally recognized as essential. The question of proper differentials to care for inherent economic advantages possessed by producers located near the primary or principal market or near a secondary market is one which cooperative associations that pool from a relatively large area are beginning to realize is important. That is, the producer located near a market has an economic advantage other than differences in transportation costs. His ease of making contact with dealers through his close proximity to the market and also the fact that he usually has less seasonal variation in supply, will enable him to stay in business when prices are too low for the more distant shipper to cover costs and have a margin of profit. Unless the cooperative association is willing to recognize this, it may find its membership gradually decreasing in the near-by areas. Generally speaking, the farmer near a city, because of his longer experience in fluid-milk marketing, has adjusted his production to his demand; hence he has less seasonal variation in supply.

Once the limits of the pooling areas have been defined and equitable differentials have been set up to care for economic differences, the problem of converting the raw product into such various uses as will yield the greatest net returns for the industry is of prime importance.

A cooperative fluid-milk marketing association is confronted with the problem of supplying the market with as large a supply as it will take for fluid use at a given price and of converting the remainder of the supply controlled by the association into various forms, such that the net receipts from all sources (and from all uses) will give a maximum return to the membership. It is probable that attempts will be made to effect similar development in pooling by large areas with other commodities.

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